Table of Contents

CHAPTER 1

SYSTEM OVERVIEW

The Fortune 32:16 family of business computer systems are designed to meet the needs of today's serious minded businessmen, with the power of a multiuser, multitasking minicomputer operating system, in a simple to operate desktop microcomputer. The systems are designed to allow users to configure office automation systems to conform to the particular needs of their businesses, and to allow maximum flexibility as that business grows, from a single user word processor to an international network of computer systems.

To meet these needs, the Fortune 32:16 systems have been designed with the following features:

- The Motorola 68000 microprocessor. The most powerful microprocessor currently available.
- The Fortune operating system FOR:PRO, based on the UNIX[tm] minicomputer operating system originally developed by Bell Laboratories
- Easy to use menu-driven integrated application software which provide the user with powerful word processing, electronic spread sheet, business accounting capabilities
- A comprehensive array of communications capabilities which allow a user to interface with other computer systems to access and use their data bases.
- A modular design of the hardware and software for ease of system maintenance, and expansion.
- A worldwide network of authorized dealers, and service centers to support the 32:16 system hardware and software, insuring that each user has access to the latest technology with which to manage the system.

UNIX is a trademark of Bell Laboratories

THE FORTUNE 32:16 FAMILY HARDWARE CONFIGURATIONS

The Fortune 32:16 system family is offered in configurations to provide for the varying needs of a wide range of users. **System 5** is the basic system and consists of the following hardware assemblies:

A monitor containing
- a 12-in cathode ray tube (CRT)
- an analog circuit board
- a high voltage flyback transformer

A central processing unit containing
- a power supply
- a central logic assembly (Motherboard)
- a monitor controller
- a 256KB memory board
- a 1 megabyte flexible disk drive
- a 5 megabyte hard disk and controller
- three optional expansion slots to connect additional users or devices to the system.

A keyboard containing
- a keyswitch assembly
- a keyboard electronics board

The **System 10** and **System 20** are the same as the System 5 with the additional storage capacity of a 10 or 20 megabyte hard disk drive.

The **PS-10** and **PS-20** systems are limited capability systems 10 and 20 with only one expansion slot for additional users or devices.

The **XP-20** and **XP-30** systems are the high performance systems with full expansion capacity, and high speed 20 or 30 megabyte voice coil disk drives for high use multi-user systems where maximum performance is required

OPTIONAL HARDWARE

The Fortune 32:16 system capabilities can be expanded through the use of add on hardware options. The options are designed so that the user can obtain an optimum system configuration to meet immediate computing needs, yet be assured of increased capacity for future needs.

Additional memory is available for the system in 128KB or 256KB increments. As the user's system grows, the performance of the system can be improved through additional memory.

Additional online hard disk storage of up to three hard disk drives to allow for system expansion when needed.

Streamer tape cartridge storage to allow the user quick and easy backup and restoration of system data and software.

Asynchronous Communications controller (CommA) can be installed in 2 or 4 port increments. Additional printers, intelligent workstations, or communications links to other systems can be easily added to the system.

Synchronous Communications controller (CommB) can be installed in 2 or 4 port increments to communicate with devices using synchronous communications protocols.

FOR:PRO OPERATING SYSTEM

The Fortune 32:16 family of systems are among the first microcomputer systems capable of using a powerful minicomputer operating system UNIX. Originally developed in 1967 by Bell Laboratories, UNIX is currently in use by the Bell System telephone network as the operating system for an impressive array of applications from local and long distance telephone call switching to the accounting program which prepares and prints your monthly telephone bill.

FOR:PRO the Fortune operating system is an improved version of UNIX which through use of unique user friendly menus enables the non-technical user access to the power of UNIX without having to learn the technical command syntax of an operating system.

APPLICATIONS SOFTWARE

Fortune Systems has developed or licensed applications designed for the business user. These applications include Fortune:Word word processing, Multiplan electronic spreadsheet, and the SMC Business Basic Applications System.

Fortune:Word Word Processing

The word processing system has been developed by Fortune Systems to provide significant improvements over the word processors currently available. With Fortune:Word, the user easily can create, edit, print, file and retrieve documents, quickly with a minimum of operator training.

Business Applications

Business Basic Applications System (BAS) from Science Management Corporation, has been licensed and modified to operate with the Fortune system. The applications which are fully integrated and easy to use, include General Ledger, Accounts Receivable, Accounts Payable, Payroll, Fixed Assets, Purchase Orders, and Inventory Control. The BAS applications are designed to give accurate and up to date accounting information through easy to use menus, yet meet the accepted accounting standards of records keeping and audit trails.

Multiplan

Multiplan, is product of the Microsoft Corporation which has been licensed and modified to operate with the Fortune system. Users of Multiplan are capable of generating and linking financial, mathematical or statistical computer models, and then observe the effects on the totals as input variables are changed. Several different models can be saved in the system, archived to flexible diskette, or printed. Comparisons can then be made against actual information as it becomes available so that the theories used while modeling can be tested. Multiplan is a valuable tool for users whether preparing the annual budget for a business, planning stock purchases, or vacation expenses.

CHAPTER 2

HARDWARE OPERATION

The Fortune 32:16 hardware has been designed for ease of maintenance. Each system assembly can be easily exchanged, and problems quickly isolated and resolved with a minimum of user downtime. A key to the ease of maintenance is an understanding of the operation of the system hardware. This chapter provides an overview of the system hardware, and how the various subsystems interact with each other. The system block diagram (Figure 2-1), is a representation of the system hardware interface. Refer to it while reading this chapter to help keep the information in perspective.

CLA DATA BUS

The central logic assembly data bus consists of 16 data paths, and additional bus control paths. The CLA data bus is connected to all major system devices and is used to transfer data between the microprocessor, memory and system devices.

CLA ADDRESS BUS

The central logic assembly address bus consists of 23 address lines, and additional bus control paths. The CLA address bus is connected to all system devices, and is the means by which system devices are addressed.

MEMORY

The memory is used to store the system programs and data for use by the microprocessor. The information stored in memory is organized in 16-bit words; each word is divided into two 8-bit bytes. Each byte has an individual 24-bit address associated with it, starting with location 0 and continuing through the last location in memory. Each byte of data stored in memory has a parity bit for error detection.

The 32:16 has a minimum memory capacity of 512KB expandable in 256KB increments to a maximum capacity of 1 megabyte.

MEMORY MANAGEMENT UNIT

The Memory Management Unit (MMU) is the interface between the processor address bus and the CLA address bus. The MMU under control of the operating system dynamicaly reallocates system resources as required without time consuming software algorithms or dedicated memory management schemes.

The MMU also allows areas of memory to be write-protected so that important system information cannot be destroyed inadvertently. This feature protects the system from software errors which are difficult to detect or correct, and protects each users data from damage caused by another user.

THE MICROPROCESSOR

The Motorola MC68000 microprocessor chip is the heart of the 32:16 computer. The name 32:16 is derived from the internal architecture of the 68000, in that the registers in the chip are 32-bits wide while the data paths are 16-bits wide.

Within the 68000 chip, are eight 32-bit data registers, seven 32-bit address registers, two 32-bit stack pointers, one 32- bit program counter, and one 16-bit status register. The chip is capable of directly addressing up to 16 MB of memory, and can move data one or two bytes at a time into or out of its internal registers.

The external connections of the 68000 are shown in Figure 2-2. There are 64 input/output pins on the chip grouped as follows

- Processor Address Bus - 23 unidirectional address bus lines A1 through A23 used to provide a base address to the MMU.
- Data Bus - 16 bidirectional data lines D0 through D15 to transfer data into and out of the microprocessor.
- AS - Address strobe - when asserted indicates that the address currently on the Address bus is valid.
- R/W - Read/Write - when asserted the microprocessor is reading data from the data bus. When negated, the microprocessor is writing to the data bus.

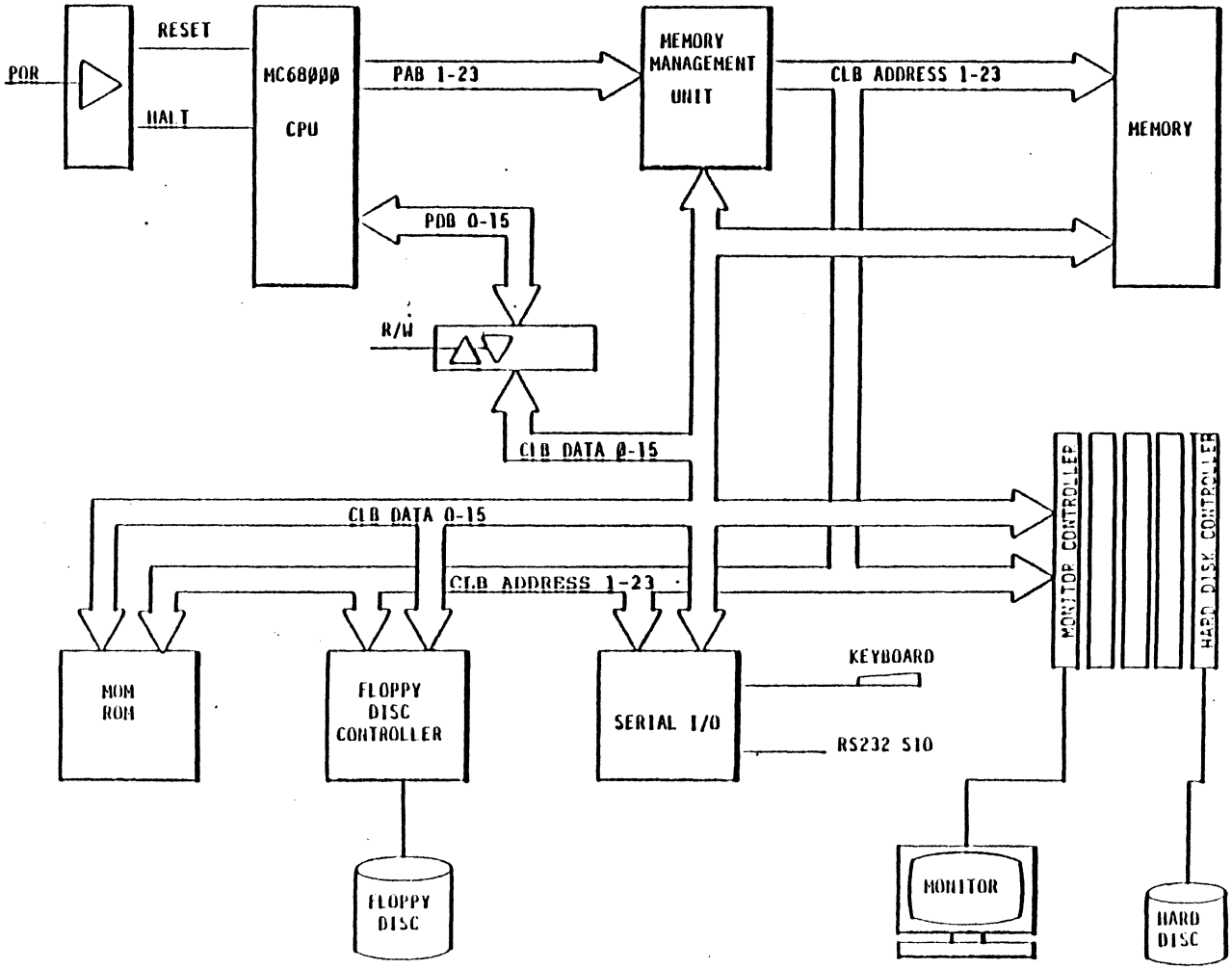


Figure 2-1

System Block Diagram

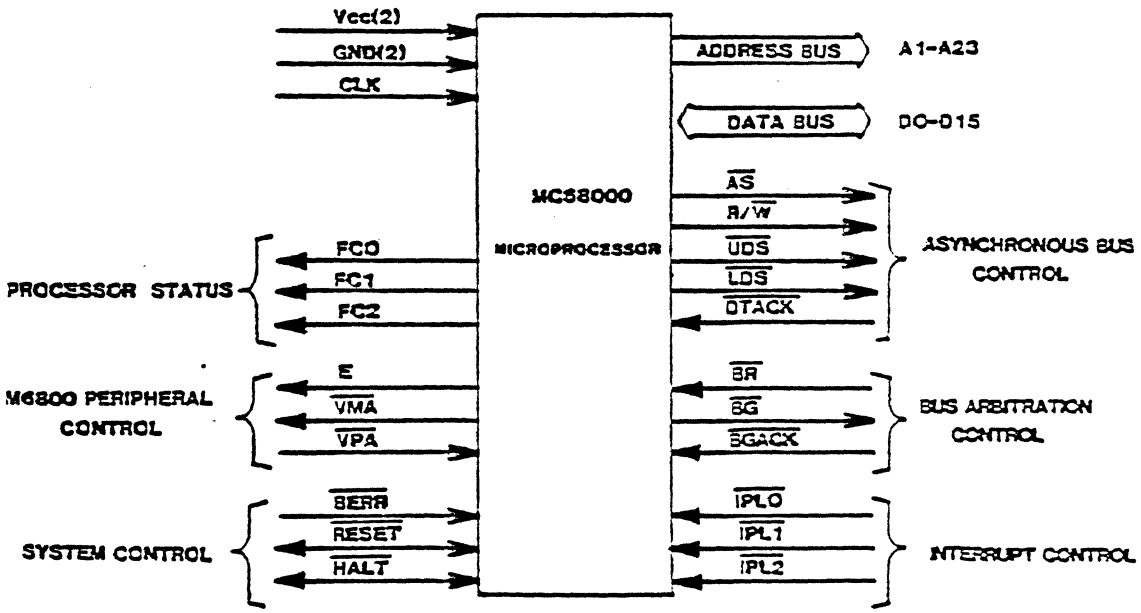


Figure 2-2

68000 Input And Output Signals

- UDS - Upper Data Strobe - when asserted, the microprocessor is addressing the upper byte of the location addressed. Equivalent to address bit 0 asserted.

- LDS - Lower Data Strobe - when asserted, the microprocessor is addressing the lower byte of the location addressed. Equivalent to address bit 0 negated.

- DTACK - Data Transfer Acknowledge - when asserted either data is being transferred into the microprocessor from the addressed device, or data transferred from the microprocessor has been received by the addressed device.

- BR - not used

- BG - not used

- BGACK -not used

- IPLØ,1,2 - Processor Interrupt bits 0,1,and 2, when asserted, indicate the priority level of the device interrupting the microprocesser. The lowest interrupt priority is level 1; the highest is level 7. (See Priority)

- Halt - Bidirectional signal that halts the micropressor (input) or indicates that the processor has executed the Halt command.

- Reset - Bidirectional signal that resets the microprocessor (input) or indicates that the processor has executed the Reset command (output).

- BERR - Bus Error - when asserted a bus error has been detected by the system. The Bus Error can be caused by either hardware or software errors.

- VPA - not used

- VMA - not used

- E - not used

- FC 0,1,2 - Function Code bits 0,1 and 2 from the Processor Status Word indicate what function the processor is performing and are decoded as follows:

Binary	Decimal	Function
FC = 000	(0)	Unassigned
FC = 001	(1)	User Data
FC = 010	(2)	User Program
FC = 011	(3)	Unassigned
FC = 100	(4)	Unassigned
FC = 101	(5)	Supervisor Data
FC = 110	(6)	Supervisor Program
FC = 111	(7)	Interrupt Acknowledge

- CLK - 5.5 Megahertz clock (180 ns/cycle)

- GND - Electrical Ground

- Vcc - +5 VDC

MICROPROCESSOR OPERATION

The microprocessor performs its work by fetching instructions stored in memory and executing those instructions. For example if the instruction were to add two numbers, the processor would address and read in the first number from memory, then the second number, add the two together and store the sum in another memory location.

The process is more complex however, when the processor must retrieve a word processing file from a location on the hard disk and load it into an area of memory not being used by any other user, and display the information on the proper screen, and at the same time keep the Multiplan data coming in from another terminal from getting mixed in.

PRIORITIES

Part of the process which makes the operation of the microprocessor less complex is the assignment of a priority to each device. Since the microprocessor is capable of executing only one instruction at a time, each function must be prioritized so that it can be serviced in a logical sequence.

Generally, priorities are assigned to devices in relation to their data transfer speed and relative importance in the system. Slower devices usually are assigned a lower priority.

The fastest devices such as the hard disk controller and CommB controller, are capable of transferring data to and from memory directly with their own on board processors, and are called direct memory access or DMA devices. Bus arbitration circuitry on the motherboard determines which DMA device controls the bus, and therefore has access to memory. The microprocessor is assumed to always want the bus. Whenever the microprocessor and a DMA device contend for the memory, the arbitration circuitry allows both devices to share the bus each transferring one byte at a time.

Interrupts

Other devices in the system such as the keyboard, and CommA controller, are so much slower or are not used as often as the DMA devices. A dedicated processor for each device only used to move data to and from memory would be uneconomical . The keyboard for example, can move 240 characters a second (2400 baud), while the microprocessor can move over 400,000.

A way has been devised to interrupt the processor and have it execute a service routine to move data between these slower devices and memory. The interrupting device responds to the microprocessor with a "vector number", which is the address of the address of the location of its service routine. The interrupt sequence flow chart (figure 2-3) shows how a typical interrupt is processed.

The processor has the capability of "masking" or not responding to selected interrupts so that when the system is busy it won't be disturbed by a low priority device. Interrupt masks are set by the system software, and are a part of the processor status word.

With the possibility of several devices interrupting the processor at once, each device is given an interrupt priority. Table 2-1 lists the relative priority of each device in the system.

The highest priority function in the system is memory refresh, because if memory is not refreshed, data may be lost. The lowest priority device of the system is the flexible disk. Its input data is stored in a buffer and the system can postpone service to for relatively long periods of time.

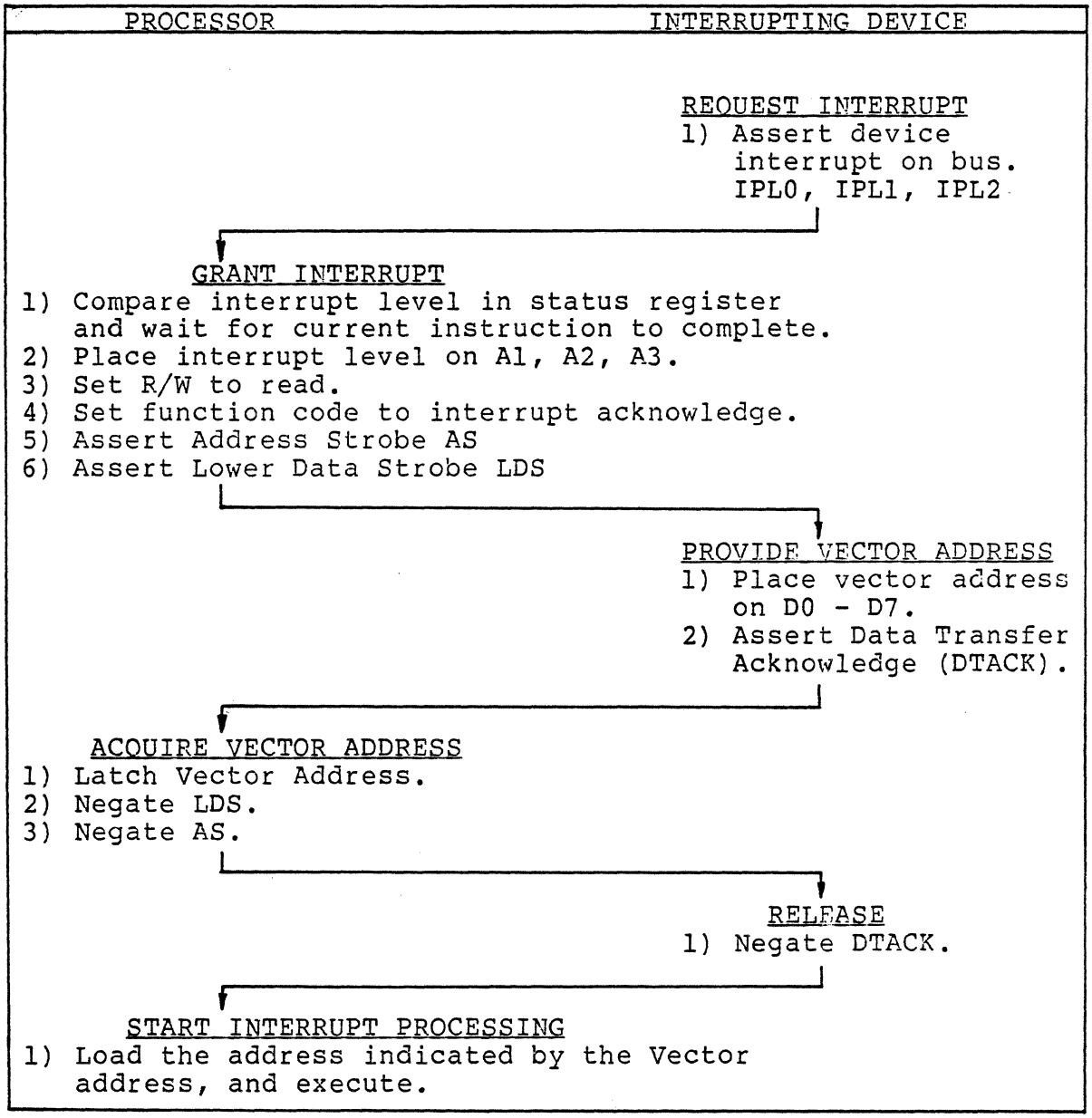


Figure 2-3
Interrupt Sequence Flow Chart

Priority Level	Devices
DMA Devices	Priority for DMA Transfer into memory is established by slot location. Slot A being the lowest, and Slot E being the highest.
MPU	The microprocessor has priority if no DMA device is active on the bus. The MPU will alternate bus cycles with active DMA devices.
Interrupt Level 7	Power Failure, Parity Error, Memory Refresh Time Out. Cannot be masked in Processor Word.
Interrupt Level 6	The Central Logic Timer
Interrupt Level 5	Serial I/O Port, Keyboard Port.
Interrupt Level 4	Comm A Board
Interrupt Level 3	Comm A Board, WD Controller
Interrupt Level 2	Flexible Disc Controller
Interrupt Level 1	Software Controlled Interrupt

Table 2-1

Relative Priority by Device

THE KEYBOARD

The keyboard consists of a standard typewriter keyboard, a ten key numeric key pad, and an array of special function keys. When a key is pressed, drivers on the keyboard electronics board detect the change and determine the x and y coordinates of an address in the keyboard read only memory chip (ROM). The character code in that location is clocked one bit at a time into the serial I/O logic. The characters transmitted from the keyboard ROM are in ASCII code (American Standard Code for Information Interchange). Characters generated by the function keys and numeric keypad are each prefaced by a control a and followed by a carriage return character.

THE SIO PORT

Each 32:16 has a serial input and output port (SIO) for communication with such external devices as a printer, modem, or another Fortune system. The SIO port can transmit or receive at speeds up to 19,200 baud, and is an EIA standard RS 232-C, DTE device.

*** * * * * * * C A U T I O N * * * * * * ***

When connecting devices to the SIO Port, refer to chapter 6 for proper cable selection. Failure to use the correct cable can cause improper operation or equipment damage.

SERIAL I/O LOGIC

The keyboard and SIO port are connected to the processor via the serial I/O logic located on the motherboard. The logic consists of a dual asynchronous receiver transmitter chip (DART), and timing and control circuits. The SIO logic is a priority 5 interrupt device and although it provides a separate vector number for each port of the DART, the interface with the processor is the same.

The DART keyboard port receives data from the keyboard one character at a time and changes it from a serial to a parallel data byte. The character is stored in the SIO logic output buffer and the processor interrupt sequence is initiated to store the byte in the keyboard input buffer in main memory.

FLEXIBLE DISK SUBSYSTEM

The flexible disk subsystem stores system data and programs on removable magnetic media so that information in the system can be more easily safeguarded and transported. The flexible disk subsystem is the means used to enter the initial system software, and to backup and archive both system software and data files.

The flexible disk subsystem consists of a flexible disk controller chip, associated timing and control logic, a 2K buffer RAM, and up to four 800 K byte flexible disk drives. Data is transferred to and from the subsystem in 1K byte blocks, one byte at a time.

HARD DISK SUBSYSTEM

The hard disk subsystem provides the system with a large capacity online storage for system software and data files. The subsystem consists of a microprocessor controlled DMA disk controller and up to four hard disk drives of 10, 20 or 30 megabytes each.

When the system needs data files or software loaded into memory, the 68000 microprocessor transfers to the disk controller the address of the file it wants, and the location in memory where the file is to be stored. The disk controller through the commands from its own microprocessor, finds the data on disk, loads it into the designated memory location via a DMA transfer, and notifies the system when the transfer is completed.

MOM ROM

The system MOM ROMs, located on the motherboard, are two 8KB EPROMs containing software and data used to power up the system. After the microprocessor detects a power on reset, it loads and executes the start up program located within the MOM ROM. The start up program will direct the execution of power on diagnostics, system auto configuration, and loads the operating system.

MONITOR SUBSYSTEM

The monitor subsystem displays information for the operator. The monitor subsystem consists of a monochrome monitor and a character generator. Data to be displayed is loaded by the microprocessor into RAM on the monitor controller. Characters are read from the RAM by the crt controller logic as they are displayed on the screen.

Each character consists of a matrix 9 dots wide and 10 dots high. There are 25 lines of 80 columns each displayed on the screen. Each character stored in the RAM consists of one byte of character data, and one byte of character attribute data. The system is capable of displaying character attributes such as reverse video, highlighted video, underline, double-underline, overstrike, and other special attributes.

CHAPTER 3

SOFTWARE OPERATION

THE OPERATING SYSTEM

The Fortune 32:16 family of computers are among the first available microcomputer systems capable of using the powerful minicomputer operating system, UNIX[tm]. A multiuser, multitasking operating system, UNIX was developed by Bell Laboratories in 1969, on a DEC PDP 7 minicomputer*. The software has been improved and adapted for use in a varity of minicomputer systems around the world.

Fortune Systems has enhanced UNIX to make it an easy to use microcomputer operating system compatible with both the Motorola 68000 microprocessor and the flexible disk environment of an efficient office system.

The primary enhancement is a user friendly shell that allows the user to access the power of the system without having to enter UNIX commands. Easy to use menus direct the user through applications designed to meet his needs.

The Fortune Operating System (FOR:PRO) is based on UNIX version 7.0, with additional utilities from the University of California at Berkeley 4.1 UNIX, and the Bell Laboratories UNIX system 3. Complete documentation for all available system utilities and commands is provided as a part of the Software Development Tools

APPLICATIONS SOFTWARE

Fortune Systems has developed or licensed applications designed for the business user. These applications include Fortune:Word, Multiplan, and the SMC Business Applications System. Also available are a wide variety of progrmming languages and software development tools. Each package has been adapted to use with the Fortune Operating System (FOR:PRO), with its menu driven ease of use.

Fortune:Word and Fortune:Word Plus

These word processing systems were developed by Fortune Systems to provide significant improvements over the word processing systems currently available. With the word processor, the user can compose, edit, print, file and retrieve documents, quickly and easily with a minimum of operator training. Enhancements are also available for Fortune:Word, including; Records Processing, Spelling Aids, and Advanced Features. These enhancements may be ordered separately, or Fortune:Word Plus may be ordered which inlcudes all enhancements.

UNIX is a trademark of Bell Laboratories
* DEC PDP 7 is a trademark of Digital Equipment Corporation

Business Applications

Business Applications from Science Management Corporation have been licensed and modified to operate with FOR:PRO. The applications, General Ledger, Accounts Receivable, Accounts Payable, Payroll, Fixed Assets, Purchase Orders, and Inventory Control, are fully integrated, and easy to use. The BAS applications are designed to give business people accounting data that is accurate and up to date, so that decisions can be made quickly, and backed up with accurate information.

Multiplan

Multiplan, a product of Microsoft Corporation has been licensed and modified to operate with FOR:PRO. Users of Multiplan are capable of generating and linking financial, mathematical or statistical computer models, and then observe the effects on the totals as input variables are changed. Several different models can be saved in the system, archived to flexible diskette, or printed. Comparisons can be made against actual information as it becomes available so that the theories used while modeling can be tested. Multiplan is a valuable tool for users whether preparing the annual budget for a business, planning stock purchases, or vacation expenses.

Languages

Most of the more popular programming languages are available, including; Business Basic interpreter, C Basic, COBOL (MICRO FOCUS Compiler), FORTRAN-77, Pascal (U.C. Berkley), and C Language. Fortune Development Utilities are also available.

NOTE

For a complete list of System and Application Software packages refer to your Dealer Software Catalog.

SOFTWARE CLASSES

Each system is supplied with Single User FOR:PRO. An optional Multiuser Operating System may be added to allow for a multiple user system. Three levels of Applications Software are available for the Fortune 32:16 family, and are identified as class A, B, and C.

Class A software is developed by Fortune Systems, or licensed from a third party and is fully supported and documented by Fortune Systems. Class A software is protected by a software security system which will not allow the use of the software on unauthorized or unlicensed systems (see below).

Class B software is recommended by Fortune Systems, but is supported and documented by the vendor. Class B software has been tested by Fortune Systems and found to be substantially error free and compatible with the Fortune Operating System. Class B software is not protected by the software security system.

Class C software is all other software applications which are available and operate under the Fortune Operating System, but have not been tested for compatibility with other Fortune Software packages. Class C software is not documented or supported by Fortune Systems.

SOFTWARE SECURITY

A means has been developed for the 32:16 system, to protect the software from being loaded into a system for which it has not been licensed. Each Application disk is licensed to operate in only one system. Use of the same software in another system is a violation of the Software License Agreement.

Once a Class A software disk has been loaded into a system, it cannot be used to load that application into any other system.

If an attempt is made to load an application from one system into another, the system will either not load the application, and notify the operator that an "illegal" disk is loaded in the system, or the application will not run when selected from the global menu.

SOFTWARE MAINTENANCE

The 32:16 is capable of holding the total business records and future plans of a good sized company. The loss of those records and plans because of a system failure, can be catastrophic to a business

System management practices to safeguard system software and data should always be taken. Backup copies of the operating system and application software should be made and kept in a safe place. Backup copies of the data files should be made as often as practical so that if trouble arises, the system can be brought up to date as soon as possible. The disks used to copy the operating system, applications, and data files should be certified for a minimum of 96 tracks per inch, 80 tracks per side double-density, double-sided, soft sectored.

The system will not allow installation, removal or duplication of system software unless the operator is logged in as "manager".

Backing Up The Operating System

The "cold boot" backup procedure is totally menu driven. Select "S5 Product Maintenance" from the global menu. The Product Maintenance menu will be displayed. Type "b" and observe that the word "backup" is highlighted on the menu, and press <RETURN>.

A menu of the software currently loaded on the system will be displayed. Type a "c" and observe that the word "Cold Boot" is highlighted and press <RETURN>. The system will display a step by step set of instructions which will produce three Cold Boot disks. Be sure to label the disks so that they don't get mixed up.

'Cold Booting' the system (Loading FOR:PRO from flexible to hard disk)

Power on or reset the CPU, while holding down the Cancel/Del key. The maintenance menu will be displayed as shown in Figure 3-1

```
          Copyright (c)  Fortune Systems,  Rev 1.0

     F1  Change front port speed          2400
     F2  Change back port speed           9600
     F3  Change power-up action           Boot up
     F4  Change boot device               WD Boot, Drive 0
     F5  Change boot program number       0
     F6  Change floppy drive 0 type       Tandon
     F7  Set boot file name               hd02/unix
     F8  Read settings from EAROM
     F9  Save settings from EAROM

         EXECUTE
         HELP

              Type any highlighted key

           EAROM has been changed x times
```

Figure 3-1
Maintenance Menu

Load the Cold Boot disk #1 into the flexible drive. Press the function key <F4>, and observe that "Change boot device" adjacent to F4 is now highlighted. Press the space bar until the boot device is changed to "Floppy Drive 0".

Press the function key <F7>, and observe that "Set boot file name" adjacent to F7 is now highlighted, and that "hd02/unix" is no longer displayed. Enter "fd02/sa/reconf" and press <RETURN> and <EXECUTE>. The system will then display the configuration Menu as in Figure 3-2

Press <RETURN> until the cursor is next to "root device", and enter "fd02". Press <RETURN> until the cursor is next to "swap device", and enter "fd01". Press the function key <F3> to GO, the system will then ask for the Boot file name. Enter "fd02/unix". The system will start loading the files from the first Cold Boot disk. Shortly afterward, the system will ask about the type of the hard disk, number of users, and whether to reformat the hard disk. After responding to the questions, the system will format the hard disk then load files onto it.

```
                Fortune Systems Configuration Menu


     Power up action = BOOT              Daylight Savings = YES
         Boot device = hd                  Line frequency = 60
        Boot drive # = 00                        Language = AMERICAN
      Boot Program # = 00                  Floating Point = YES
           Boot file = hd02/unix               Hex Number = FFFF
       Flex drive #1 = SHUGART            Number Buffers = 100
       Flex drive #2 = SHUGART             Number inodes = 100
       Flex drive #3 = SHUGART               Number files = 100
       Flex drive #4 = SHUGART               Number texts = 050
         Root device = hd02                 Number clists = 010
         Swap device = hd01               Number processes = 050
    TTY00 port speed = 2400               Max process size = 256
    TTY01 port speed = 9600                Set params auto = YES
    Console location = CRT              Approx. # of users = 3
            Timezone = PACIFIC

                EAROM has been changed xx times

            Revision 1.7 Sun Jun 26 23:33:48 PDT 1983
  F1 STORE SCREEN DATA IN EAROM    F2  READ CURRENT EAROM SETTINGS
  F3 RESTART WITH SCREEN DATA      F4  CONTINUE WITH SYSTEM STARTUP
```

Figure 3-2
Configuration Menu

After about two or three minutes (depending on memory size), the system will prompt the operator to power the system off then on again. The system will complete loading files from disk #1 and then prompt the operator to insert disk #2. When the system is finished loading the files form disk #2, it will prompt the operator to remove disk #2, and insert disk #3. When the system is finished loading the files from disk #3 it will prompt the operator to remove the disk and eventually come up to the date and time prompt, followed by the logon prompt.

After a cold boot, the system will only contain the cold boot, system management and system utilities. The applications will have to be loaded onto the system from back up copies.

Backing Up The Applications

The Applications backup procedure is totally menu driven. Login as "manager", and select "S5 Product Maintenance" from the global menu. The product maintenance menu will be displayed. Type "b" and observe that the word "backup" is highlighted on the menu, and press <RETURN>.

A menu of the software currently loaded on the system will be displayed. Select the application to be backed up, by pressing the first letter of the selection and observing that the correct application is highlighted. Press <RETURN> and the system will display a step by step set of instructions which will produce a backup application disk. Be sure to label and date the disk.

Loading Applications

Login as "manager" and select "S5 Product Maintenance" from the global menu. The product maintenance menu will be displayed. Select "i" and observe that "install" is highlighted and press <RETURN>. The installation menu will be displayed, and ask that you insert the flexible disk volume #1, and press <RETURN>. The system will read the disk and display the product name and part number on the screen. Verify that it is the same application that you want to install. The system will then install the application.

SYSTEM ERROR MESSAGES

When errors are encountered during system operation, an error message will be displayed on the console. The operating system error messages are defined in Table 3-1. System errors can be caused by either software and hardware malfunctions, or improper system configuration, or a combination of all three. Due to the relative complexity of all the possible causes for system errors it is recommended that Software Support be contacted when ever an error occurs for which there is no apparent cause.

Table 3-1
Operating System Error Messages

Error Number	Meaning	Recommended Action
1	Invalid block device	Contact Software Support
2	Invalid device table entry	Contact Software Support
3	Error in swap I/O	Contact Software Support
4	IOCCOM	Contact Software Support
5	No file system	Contact Software Support
6	Timeout table overflow	* Power on reset. If problem does not clear, there is the possibility that there are too many workstations for the operating system. Contact Software Support.
7	No mount table	Contact Software Support
8	Error reading in root inode	Contact Software Support
9	Running dead process	Contact Software Support
10	No more process table entries	Contact Software Support
11	No more swap space	Power on reset.
12	No more swap space	Power on reset.
13	Unexpected trap	Power on reset. If the problem does not clear. contact software support.

Table 3-1
Continued

Error Number	Meaning	Recommended Action
14	Kernal bus/address error	Record message number and all events immediately preceding the message, i.e., number of users, applications in use, etc. Power on reset. If problem does not clear, contact Software Support.
15	Invalid ROM format	A ROM has failed.
16	Double parity error	System memory has failed. Double Bit error.
17	Refresh timeout	Probably a hardware error. The system is unable to refresh memory.
18	The init file dead	Contact Software Support.
19	Mfree overrun. Memory allocation error	Power on reset. Contact Software Support if problem does not clear.
20	Zero wchan	Software error. Power on reset. Contact Software Support if problem does not clear
100	Hardware failure	Troubleshoot hardware.
120	Memory parity error	Single bit error in memory
121	Unable to log error	Contact Software Support The system is not able to tell what is wrong

Table 3-1
Continued

Error Number	Meaning	Recommended Action
122	Spare table overflow Space unavailable. Hard disk and flexible disk overflow.	Contact Software Support
123	Spurious interrupt Unexpected hardware problem	Troubleshoot hardware
124	Can not read configuration block.	Power on reset. If problem does not clear, suspect hard or flexible disk problem.
125	Invalid magic number in configuration block	Power on reset. If problem does not clear, suspect hard or flexible disk problem
128	Physio to an odd address Program error, Configuration is inaccurate.	Power on reset. If problem does not clear, contact Software Support.
129	No more file table entries	Power on reset. If problem does not clear, increase approximate number of users on configuration menu by one.
130	No more inode table entries	
132	Address in inode 2 24 File system error	Power on reset. If problem does not clear, contact Software Support.
133	Stuff Operating System error	Contact Software Support.
134	Invalid user access Operating System error	Contact Software Support.
135	Error doing suiword Operating System error	Contact Software Support.

Table 3-1
Continued

Error Number	Meaning	Recommended Action
136	Error in process queue	Contact Software Support.
137	No text table entries	Increase approximate number of users by one on configuration menu. If problem does not clear, contact Software Support.
138	Random Interrupts	Hardware problem. Power on reset. If trouble does not clear, troubleshoot hardware
139	Bad free count	File system error. Power on reset. If trouble does not clear, contact Software Support.
140	No more space The disk is full	Power on reset. If trouble does not clear, remove some files from disk. If trouble does not clear, contact Software Support.
141	Bad block	Power on reset. The File system is not properly configured.
142	No inodes The disk is full	Power on reset. If trouble does not clear, remove some files from disk. If trouble does not clear, contact Software Support.
143	Bad Count The file system is not consistent	Power on reset. If trouble does not clear, contact Software Support.
144	Hardware Error	Troubleshoot hardware.

Table 3-1
Continued

200	Hardware Error	Troubleshoot hardware
400	Software Failure	Contact Software Support
800	Software Error	Contact Software Support.

*Power on Reset - Turn off system power. Wait approximately 10 seconds. Power on the system.

Introduction to the Fortune Operating System (UNIX)

The following documentation is designed to give the first time user and/or the hardware technician enough information about the general operation of the Fortune Operating System to preform those maintenence functions necessary to effectively support the Fortune 32:16 System. It should be understood that some 'poetic license' has been taken in an effort to give the general idea of the operating system while remaining as non-technical as possible.

This document is intended to be used with the 'Introduction to FOR:PRO' manual which it references. Introduction to FOR:PRO is provided in the field engineering hardware course material. If the Field Service Manual is not being used in conjunction with the hardware course the Introduction to FOR:PRO manual may be ordered separately from any authorized Fortune dealer. (Order number 1002268-01).

More detailed information on UNIX is available in an ever-increasing number of reference and technical manuals. Good sources for these manuals are university book stores and technical book stores.

Table of Contents

Introduction to the Fortune Operating System (UNIX[tm])

Introduction

UNIX is a general purpose, multi-user, interactive operating system developed at Bell Laboratories for the larger DEC PDP-7* computers. It offers a number of features, including;

a. A hierarchial file system incorporating demountable volumes,

b. Compatible file, device and inter-process I/O,

c. The ability to initiate asynchronous processes,

d. System command language selectable on a per-user basis (Shell),

e. Many subsystems including several languages,

f. High degree of portability.

The portability of UNIX is largely due to its being written in a high level language, C. UNIX was originally designed by and for computer programming researchers, but its power and structure led to its use for a wide range of applications. UNIX is becoming the standard operating system for the current generation of 16-bit micro-computers and 32-bit mini-computers.

The File System

The most important function of an operating system is to provide a file system. The UNIX file system is a hierarchial structure containing three types of files: ordinary files, directories, and special files.

Ordinary Files

An ordinary file is an array (one-directional) of bytes. The bytes may contain machine code, binary data, ascii text, symbolic code, etc. No other structure is implied by the system, i.e. ISAM, fixed length records, etc.

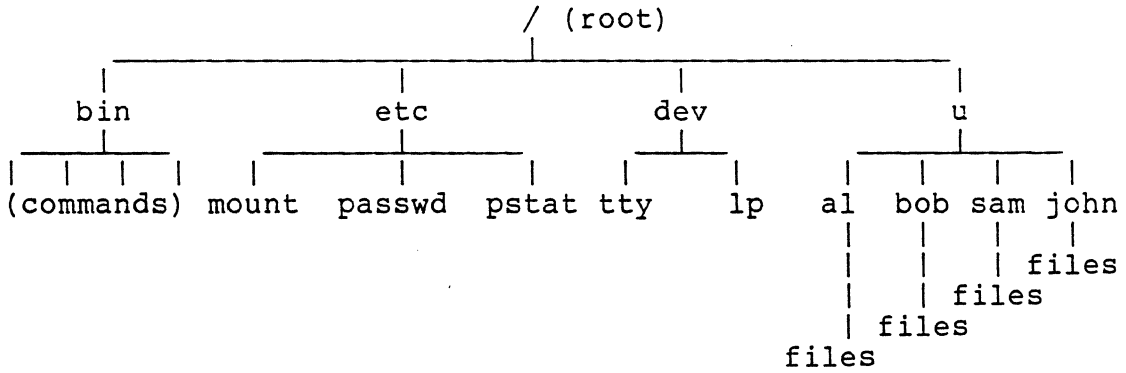
UNIX is a trademark of Bell Laboratories.
* DEC and PDP-7 are trademarks of Digital Equipment Corp.

Special file structures may be imposed by user programs, i.e. the a.out format produced by the assembler and expected by the loader. Files are independent and can be attached anywhere (and possibly multipley) onto a hierarchy of directories.

Directories

The hierarchial file structure is imposed by files known as directories. These files provide a mapping between file names and the files themselves. By allowing directories to contain entries for other directories a 'tree' structures can be created. Each user has his own 'home' directory, under which he may create files and/or subdirectories and, under the subdirectories, he may create more files and/or subdirectories.

Hierarchial Directory Tree Example



System Directories

There are several 'special' directories maintained by the system. These contain special system information, commands, devices, temporary files, etc. Some of these directories are;

a. root (/) (Super-user's home directory, top of tree, includes special info)

b. dev (/dev) (Contains I/O device info)

c. bin (/bin) (Commands)

d. etc (/etc) (Contains miscellaneous information files and commands)

e. u (/u) (Contains user directories and/or files)

Current (Working) Directory

To make it easy to access files in the hierarchy, UNIX has a concept called the current or working directory. When a user logs in, his location on the hierachial tree is his home directory, and is also the current or working directory at that time. There are UNIX commands which allow us to display our current or working directory and to change directories, thereby allowing us to move around in the 'tree'. These commands will be discussed later.

Special Files

Special files are one of the most unusual features of the UNIX file system. Each I/O device on a UNIX system is associated with at least one special file. These files are read and written just like ordinary files. The I/O request activates the associated device and device driver. Special device files are generally located in the directory /dev.

File Names

UNIX file names can be composed of up to 14 characters from the ascii character set except (/). However some characters are special to the shell and file names containing them are difficult to manipulate. Non-printing and control characters are legal but also difficult to manipulate. Also avoid using the following characters)(;*|&<>?{}`~ null and space.

Path Names

When refering to a file <u>not</u> in the current directory a 'pathname' is used. A pathname gives the path to follow through the directory tree structure to locate the file. A pathname can be absolute or relative to the current directory.

Full Path Name

An 'absolute' or full pathname begins with a '/', which is the name of the root directory of the entire file system. After the slash (/) comes the name of each subdirectory separated by slashes until the file name is reached. For example /u/al/UNIX is the full path name of the file used to create this document.

Relative Path Names

A file can be addressed relative to the current directory by using double dot '..' for the parent directory (the directory before the current directory) or single dot for the current directory. This shorthand can be useful when dealing with files 'deep' in the tree.

Linking

Files can by referenced by several directories via 'links' (i numbers). A file can have several names in different directories, all pointing to the same physical space on the disk. All links to the file have equal status and the file is not destroyed until all links to it have been removed. More on links will be discussed later.

Protection

The protection mechanism of the UNIX file system is simple, yet it contains some unusual features. Each user of the system is assigned a unique user identification number (uid). When a file is created it is marked with the uid of the user and the owner's 'group' identification number (gid).

Protection Codes

There is a set of ten protection bits associated with each file and directory. Nine bits are used to define the read, write, and execution permissions (three bits each) for the owner of the file, his 'group', and all remaining users (the rest of the world). For directories, the execution bit denotes permission to search the directory for subdirectories and files.

Character Representation

The protection codes for a file or directory can be displayed by using the 'ls -l [filename]' for one particular file, or 'ls -l' for all the files under the current directory, or 'll' (same as ls -l). They appear as nine characters in the following format: rwxrwxrwx. The first three characters define the protection codes for the owner, the second three define the owners group permissions, and the last three define the permissions for the rest of the world. If a permission is denied the

character is replaced by a dash (-). For example, rwxr-x--x, would give read, write, and execute permission to the owner, read and execute permissions to the members of the owner's group, and only execute permission to the rest of the users on the system.

Octal Digit Representation

The three groups of three bit protection codes fall into octal (base eigth) representation. Some UNIX commands will use the octal code rather than the character method. The above example of rwxr-x--x translates to an octal code of 751. The table below shows the octal translation for each of the eight possible code values.

Character	Octal	Permission Granted
---	0	none
--x	1	execute only
-w-	2	write only
-wx	3	write and execute
r--	4	read only
r-x	5	read and execute
rw-	6	read and write
rwx	7	read, write, execute

Set-user-id Bit

The tenth bit is known as the set-user-id bit. If it is on, the system will temporarily change the uid of the current user to that of the owner of the file when the file is executed. The change is only effective during execution of the program. This set-user-id feature allows privileged programs to access files inaccessible to other users. The set-user-id bit is displayed as an 's' in place of the owner execution bit; i.e. rwsr-x--x. (This bit is reset if the file is copied, and only works for a compiled program, not a shell script [see The Shell].)

Group

A 'group' is a logical collection of user names defined in the file /etc/group. It is used to define a small group of users who can access a set of files and/or directories. For example, a group of programmers involved in a specific project can be put into the same group and have access to the project files which are protected against access by all other users. A user can be a member of several groups, but is active in only one group at a time.

Super-user

The 'super-user' (login = root) is a very special and powerful user. The system recognizes root as exempt from the usual constraints on file access. The super-user has read and write access to any and all files on the system no matter what the protection codes for those files are.

This can be very helpful in dealing with large sections of the file system without interference from the protection system, howerver, care must be taken when operating as super-user as it is easy to delete entire sections of the directory tree inadvertently and irretrievably!

The File System Stucture

The UNIX file system is a disk data structure accessed via block stuctured I/O (see special files types below). A disk is considered to be a randomly addressable array of 512 byte blocks.

Disk Data Structure

UNIX divides the disk into <u>at least</u> two partitions. A partition is a group of blocks reserved for a particular purpose. The number of blocks in a partition depends upon the contents or purpose of that partition. The purpose of the first three partitions is as follows;

Partition 0

This partition contains the 'Boot program', the 'Spare blocks', and the 'Configuation file'. The boot program searches for and loads the operating system or other "control' program into main memory as specified by the operator. (The operator usually enters this 'boot file name' on the maintenence screen). The configuration file contains special system and device information such as the size and type of disk and the size and starting block number of all partitions. See page 4-45 (rdconf) of the Introduction to FOR:PRO manual.

Partition 1

This partition contains 'Swap space'. Swap space is a number of blocks reserved for use as a temporary 'buffer' area for programs (called processes) awaiting main memory resourses.

NOTE The swap space is only used on one of the physical drives on the system, that drive is <u>usually</u> the 'root device'.

Partition 2

From the begining of partition 2 to the end of the disk is space for the files, (usually refered to as 'the file system'), the 'Super Block', and the i-nodes. The 'Super Block' contains, among other things, the 'free-list', and the 'i-list' (i stands for index).

The free space on the disk is maintained by a 'linked' list of the available blocks. This list is called the 'free list'. (A linked list is a data structure wherein each element contains the address of the next element, therefore a file can be broken up into segments and does not require contiguous space on the disk. This allows much more efficient use of disk space and much easier maintenence of files).

The i-list is a list or table of addresses of file definitions. Each file on the system has an entry in the i-list which points to another entry called an i-node. The i-node contains a description of the file including;

1. The owner and group id number (uid and gid).
2. The protection code for that file.
3. The physical address of the file on the disk.
4. The size of the file.
5. Time of creation and last update of the file.
6. Number of links to the file.

Each file on the system has an 'i-number' associated with it just as it has a 'filename' (see Directory Implementation below), this i-number is used to address the i-list to obtain the i-node for that particular file. Armed with the information in the i-node UNIX is able to physically locate the file on the disk and determine other facts about it. The use of the i-number, i-list, i-node structure also allows us to use different 'filenames' in different directories for the same physical file, and also to use the same 'filename' in different directories for different physical files. The number of directories referencing the same file via the i-number is called the number of 'links' to that file. With the correct options defined the ls (list) command will display the i-number, filename, etc. of each file.

NOTE Partition 2 may be divided into more than one partition, in which case partitions 0 and 1 remain the same but partitions 2 thru 7 (maximum) can be separate file systems.

Directory Implementation

A directory is simply an ordinary file that contains a list of file names and i-numbers. The logical directory hierarchy is imposed by allowing directory entries to reference other directories.

Removable File Systems

It is not necessary for the entire file system hierarchy to reside on the same physical or logical device. The mount command will 'attach' or link a special file associated with the disk to an existing directory on the current file system. The disk to be 'mounted' must contain a correctly formatted file system with its own directory hierarchy. After the mount there is virtually no difference between files on the removable volume and those on the permanent file system. The only exception to the rule of identical treatment is, no link may exist between one file system hierarchy and another. This is to avoid the massive bookkeeping requirment to assure removal of all links whenever the removable volume is unmounted.

Special File Types

There are two types of special files, the block file (for structured devices), and the character file (for unstructured devices). A special file has an i-node associated with it, (as do all files) except instead of containing physical addresses it contains the internal device name. A device name is actually a pair of numbers representing the device type and subdevice number. These numbers are called the major and minor device numbers.

Block Files

A block or structured device is accessed as blocks of memory 1024 bytes long. The device driver (pointed to by the major device number) provides the buffering software to implement this model in memory. Disks and tapes are an example of block devices.

Character Files

Any device not accessed in blocks of data is associated with a character file. These devices are considered to be strings of characters like ordinary files. Again the device driver implement this model in memory. Examples of character devices are:

Terminals (including the console)
Communication lines
Printers
Main memory

Processes

A process is the execution of a program. While the cpu is executing a program, that program must reside in main memory. During the execution of other processes this program lies dormant in memory unless it is swapped to disk to make room for a process of higher priority. (Remember the swap space in partition 1 of the disk?) All processes running at a given time have a process identification number (pid) associated with them.

The user memory assigned to a process is divided into three logical segments; a program text segment (instructions), a program data segment, and a stack segment. (If you are familiar with the Fortune 32:16 hardware, i.e. the Memory Managment Unit, this should ring a bell.)

UNIX keeps track of all running processes in a table. See page 1-62 (ps) of the Introduction to FOR:PRO manual.

The Shell

The UNIX command language, the interface used by the operator to communicate with the system, is known as the shell or sh. It is a program that reads and arranges for the execution of commands typed by the user. The shell may be called as a command to interpret files containing commands (shell script). See page 1-7 of the Introduction to FOR:PRO manaual.

Three different shells are available on the Fortune 32:16. They are; the Bourne shell, the Schmidt shell, and the C shell. You are using the Bourne shell while you are in UNIX. If you are operating under the menu system you will be using the Schmidt shell. If you are in UNIX and your prompt is '#' you are super-user, if your prompt is '$' you are not super-user and certain 'privledged' commands can not be used. The C shell is available if you have the Development Utilities installed on your system.

Commands

A UNIX command is simply the name of an executable file. The file can be a compiled program (binary or core image) or a text file containing other commands. The shell determines if the command is a binary (compiled) program or a command file (shell script) and executes it accordingly.

Command Format

When read by the shell, each command is a sequence or string of ascii characters (arguments) seperated by blanks. The first argument specifies the name of the command to be executed. Except for certain special characters all characters are passed to the command unchanged.

One type of argument, called 'flags' or 'switches', is used to modify the function of commands. A UNIX convention is to proceed flags with a (-). Files for the command to process are specified by entering their names as arguments. For example, a command to list the contents of a directory is ls. If this command is used with no flags and filename it will list only the filenames of those files under the current directory. If a long list (a list giving more information about the files) is desired the command can be modified by the use of flags in the following manner: ls -l will give a long list of all the commands in the current directory, while ls -l xyz will give a long list of only the file named xyz (assuming the file xyz exists). This command may be further modified to give, for example, a long list of xyz along with xyz's i-number as follows: ls -il xyz.

Command Location

Since any executable file can be a command, the system must have a means of finding commands. A user may create a command file anywhere in the system hierarchy and if, when he wishes to execute that command, he gives the full pathname to the file there is no problem, however this is rather cummbersome, therefore, the system has a 'built in' search path which is; the 'current' directory, the 'bin' directory (/bin), followed by the 'etc' directory (/etc). There are means to overcome the need for a full path name if the command file is not in one of the above directories. This proceedure is explained on page 1-26 of the 'Introduction to FOR:PRO' manual.

Redirecting The Output

Normally the output of a command is the users console, at times, however, it may be desired to send the output to some other device such as a printer. This can be done by using the 'redirect' symbol (>). For example: date is a command to display the current date. If I wish to have the date print on a printer I can use the redirect symbol in the following manner: date>/dev/lp. This will cause the output of the command 'date' to be written on the printer.

Commonly used UNIX commands

Following is an alphabetical list of some of the most commonly used commands along with their arguments and flags. In this list spaces must be entered exactly as they appear and arguments in quotes ('..') indicates an appropriate entery, for example; 'filename' means to enter the name of the file you are working with. The command, exactly as you enter it, is in bold-face print and a RETURN is assumed at the end of the command line. Below each argument is a number and the arguments indicated by the numbers are explained below that. Please keep in mind that the following examples are one of many ways to use these particular commands, as you become more familiar with the Fortune Operating System you will probably find other ways which you prefer. Wherever possible a page number in either the Field Service Manual (FSM) or Introduction to FOR:PRO manual (ITF) will be given so that you may find more information about the command.

Bootcp allows one to copy the boot program from the sa directory onto a device (such as the floppy disk). Reference; FSM Service Notice number 23A and ITF page 4-3 Sec.8.

bootcp /sa/boot /dev/rhd00 0
1 2 3 4
Where:
1=Command
2=Source of the boot program
3=Device to load boot program on (in this case the hard disk).
4=The number of the boot program (at this time always 0).

Cd allows us to change our working or current directory. Reference; ITF page 1-4 Sec. 1.

cd /bin
1 2
Where:
1=Command
2=The pathname to the directory you wish to make your current directory. (Bin in this example.)

Chmod allows us to change the permissions of a file. Only super-user, or the owner of the file is allowed to use this command. Reference; ITF page 1-6 Sec. 1, FSM page 3-19.

chmod 777 'filename'
1 234 5
Where:
1=Command
2=New permissions, in octal, for the owner of the file.
3=New permissions, in octal, for the qroup.
4=New permissions, in octal, for the rest of the world.
5=Name of the file for which permissions are to changed.

Chown allows us to change the owner of a file. Only super-user is allowed to use this command. Reference; ITF page 4-9 Sec. 8.

chown al 'filename'
1 2 3
Where:
1=Command
2=New owner name. (In this case al.)
3=Name of the file for which the owner is to be changed.

Cp is the copy command. It allows us to copy files from one place to another. Reference; ITF page 1-9 Sec. 1, FSM pages 7-36 and 7-37.

cp -rostV /f/* /diag
1 234567 8 9
Where:
1=Command
2=The '-' indicates the characters to follow are flags or modifiers to the command.
3=The first flag. (The 'r' tells the system to copy each directory and all it's sub-directories making new directories as needed. Without this flag directories are skipped.)
4=The second flag. (The 'o' tells the system to set UID and GID in the destination to those of the source.)
5=The third flag. (The 's' tells the system to copy special files if they exist.)
6=The forth flag. (The 't' tells the system to retain the modification time of the source file in the destination file.)
7=The fifth flag. (The 'V' tells the system to display the pathname of the source and the destination as it copies.)
8=The pathname of the source. (The asterisk, in this case, says to copy all the files in the 'f' directory.)
9=The pathname of the destination directory.

Dd allows us to copy and convert files. It is possible to copy an ASCII file and convert it to EBCDIC with this comand, however the following example does no conversion. Reference; ITF page 1-14 Sec. 1, FSM page 7-36.

```
dd if=/sa/boot of=/dev/fd00 bs=1k seek=10
1       2            3        4      5
```

Where:
1=Command
2=The name of the input or source file.
3=The name of the output or destination file.
4=Size of the input and output blocks.
5=Number of blocks to skip before writing the output.

Note: The following use of the dd command allows us to read all of the blocks on the hard disk file system and check for read errors. /dev/null is the 'bit bucket', therefore the output goes nowhere, and if errors are encountered reading the input they will be reported by block number.

```
dd if=/dev/hd02 of=/dev/null bs=1k
```

Dskselect allows us to select a pre-written prototype configuration block. This is the command that is run during 'cold boot' when we are asked which type of disk we have. Reference; ITF page 4-9 Sec. 8, FSM Service Notice number 23A.

```
dskselect C20
    1      2
```

Where:
1=Command
2=Type of disk to be put in the conf. block.

Find allows us to find the pathname to a file or directory anywhere in the file system. If a separate file system is mounted (see mount command) it also searches that file system. Reference; ITF page 1-32 Sec 1.

```
find / -name 'filename' -print
 1   2   3       4        5
```

Where:
1=Command
2=The directory to start the search at. / is the symbolic name of the root directory, therefore, all directories in the file system will be searched.
3=What the system is to search for. Find can also be used to search for other 'things', ie I-numbers.
4=Name of file to find.
5=An argument telling the system to print the path name on the standard output device (console).

Format allows us to format a disk (hard or floppy). Reference; ITF page 4-10 Sec. 8, FSM page 7-36 and Service Notice number 24A.

```
format -c C20 /dev/hd00
  1    23  4      5
```

Where:
1=Command
2=The '-' indicates that the character following is a flag or modifier.
3=A flag telling the system to write a conf. block on the device when it formats it.
4=The device type of the conf. block to be written.
5=The device to be formatted.

Fsck runs a file system check on the specified device. Fsck checks for such things as correct pathnames, correct free-list, correct I-list, etc. (Basically a correct Super-block.) Reference; ITF page 4-11 Sec. 8.

```
fsck /dev/hd02
 1       2
```

Where:
1=Command
2=Device to run file system check on.

Ls is the list command. It allows us to list the contents of any directory in the file system. Reference; ITF page 1-47 Sec. 1.

ls -ail /bin
1 2345 6
Where:
1=Command
2=The '-' indicates the characters following are flags.
3=The first flag. The 'a' tells the system to display all entries in the directory. (Usually '.', the current directory and '..', the parent directory are not displayed).
4=The second flag. The 'i' tells the system to display the I-number of each entery in the directory.
5=The third flag. The 'l' tells the system to give a long list, which consists of the file type (regular file, directory, or special file), the permissions, the number of links to the file, the owner, the number of bytes in the file, the date of the last modification, and the filename.
6=The pathname to the directory to be listed. (If this argument is left out the system will list the current directory).

Mkconf Allows us to make or alter the configuation block on a device. Reference; ITF page 4-29 Sec. 8, FSM Service Notice 23A.

mkconf -i C20 /dev/hd00
1 23 4 5
Where:
1=Command
2=The '-' indicates the character following is a flag.
3=The first flag. The 'i' causes the system to build the configuration block 'interactivly', which allows the operator to change entries as the block is being built.
4=The device type of the configuation block.
5=The device upon which the block is to be written.

NOTE: If the configuration block on the device is good and you wish only to alter it, ie. add blocks to the spares table, the following format will read the block from the device, allow you to alter it, then write the altered block back on the device.

mkconf -i /dev/hd00 /dev/hd00

Mkdir allows us to make a directory. The name given to the directory may be anything up to 14 characters in length, however some discretion should be used with special characters. (See page 3-17 [filenames] in the FSM). Reference; ITF page 1-52 Sec. 1.

mkdir bell
1 2
Where:
1=Command
2=Name of directory to be made. This directory will be made under your current directory.

Mkfs is the command used to make a file system on a device. Reference; ITF page 4-31 Sec. 8, FSM page 7-37.

mkfs /dev/fd02 740 1 10
1 2 3 4 5
Where:
1=Command
2=Device on which the file system is to be made.
3=Size in 1k blocks of the file system to be made.
4=Interleave factor (System).
5=The number of 1k blocks in a cylinder on this device.

Mount allows us to attach a separate file system under a directory on the current (root) file system. Reference; ITF page 4-36 Sec. 8.

mount /dev/fd02 /f
1 2 3
Where:
1=Command
2=The device containing the file system to be mounted or attached.
3=The directory on the current file system to which the separate file system is to be mounted. (There are, by convention, two empty directories in every file system's root directory which we use to mount separate file systems to. These are 'f' which we use for a floppy disk, and 'h' which we use for a hard disk).

NOTE: If the mount command with no arguments is used it will display all those devices currently mounted and the directories to which they are mounted.

More is a filter which is often used to display one screenful of information at a time, used in this manner more will stop at the end of each screen and display the prompt **--more--** at the lower left of the screen, at which time the operator may hit the space bar for the next screenful of information or the return key for one more line of information. More may also be used to display ASCII files as in the second command format below. Reference; ITF page 1-53 Sec. 1.

ls -l /dev|more
1 2 3
Where:
1=The list command to give a long list of the 'dev' directory.
2=The 'pipe' symbol. This symbol tells the system to 'pass' the output of the first command thru the program (or command) which follows. Note that this is one case in which a space is not necessary to separate arguments.
3=The program 'more' which the output of the command 'ls' will be passed to.

more /etc/passwd
1 2
Where:
1=Command
2=The path and filename of the file to be displayed.

Mv allows us to move or rename a file. Note that unlike the copy (cp) command the original or source file no longer exists. Reference; ITF page 1-57 Sec. 1.

mv abc xyz
1 2 3
Where:
1=Command
2=The name of the file which is to be renamed.
3=The new filename of the original file.

NOTE: In the above example the file 'abc' is assumed to exist in the current directory and will remain in the current directory renamed 'xyz'. It is also possible to move or rename directories, however the current directory will not allow it's self to be renamed or moved.

Od is the octal dump command and may be used to dump a file in octal, ASCII, hexidecimal, or decimal. Reference; FOR:PRO Progammers Manual page 1-196. (This manual is supplied with the FOR:PRO Development Utilities or may be ordered from Fortune Systems Corp. separately. Part number for the manual is 1002066-01).

od -ocxd 'filename'
1 23456 7
Where:
1=Command
2=The '-' indicates the characters to follow are flags.
3=The first flag. The 'o' tells the system to dump the file in octal.
4=The second flag. The 'c' tells the system to dump the file in ASCII.
5=The third flag. The 'x' tells the system to dump the file in hexidecimal.
6=The fourth flag. The 'd' telles the system to dump the file in decimal.
7=The name of the file to be dumped.

NOTE: The flags may be used in any combination and if no flags are given the output will be in octal.

Passwd allows us to assign a password to accounts, including root, manager, and newuser, if desired. Only the Super-user or the owner of the account may change or assign passwords, and if an old password exists you will be prompted to enter the old password. Please note that there are two files called 'passwd', one is in the 'bin' directory and is this command, the other is in the 'etc' directory and is an ASCII file of the actual account names, passwords (encyrpted), etc. Reference; ITF page 1-59 Sec. 1.

passwd bell
1 2
Where:
1=Command
2=The account name to put a password on or to change the password of.

Pr is the print command. Reference; ITF page 1-60 Sec. 1.

```
pr 'filename'>/dev/lp
1      2     3   4
```

Where:
1=Command
2=The name of the file to be printed.
3=This symbol is called the 'redirect' symbol. It tells the system to send the output of the command to some place other than the standard output (console). In this case we are sending the output to a device called 'lp', which stands for 'line printer'. Please note that this is a case in which a space is not necessary to separate arguments.
4=The device upon which we wish to print.

Pwd prints the path and name of the current directory.

```
pwd
 1
```

Where:
1=Command

Rdconf allows us to read the configuation block of a device. Reference; ITF page 4-45 Sec. 8.

```
rdconf /dev/hd00
  1        2
```

Where:
1=Command
2=The device to read the configuation block from.

Screen is an editor which can be used to edit any ASCII file. Screen is a full screen editor and is much easier, in most cases to use than the other editors available for UNIX. There is no reference material available for screen, however it is more or less self explanatory, and with a little practice you should have no trouble using it. Please note that screen is not standard on FOR:PRO.

```
screen 'filename'
  1        2
```

Where:
1=Command
2=Name of the file to be edited.

Shutdown is the proceedure used to 'gracefully' shutdown FOR:PRO, and it is the only way to shut the system down. Reference; ITF page 4-49 Sec. 8.

shutdown
1
Where:
1=Command

NOTE: Shutdown may be executed in three ways, from UNIX as above, by logging in as shutdown from the login menu, or by selecting S2 30 from the global menu.

Sync updates the super-block. Reference; ITF page 4-50 Sec. 8.

sync
1
Where:
1=Command

Uconf allows us to access and modify the reconfiguation menu (EAROM). If modifications are made to the reconfiguration menu those changes do not become effective until the system is shutdown and brought up again. Reference; ITF page 4-51 Sec. 8.

uconf
1
Where:
1=Command

Umount allows us to unmount an attached file system. Reference; ITF page 4-36 Sec. 8.

umount /dev/fd02
1 2
Where:
1=Command
2=The device containing the mounted or attached file system. Please note it is not necessary to specify the directory to which the file system is attached.

CHAPTER 4

INSTALLATION

POWER ON * POWER OFF * MENUS

SETTING UP

Place the computer on a suitable table or desk. Make sure that the there is plenty of clearance to the rear, bottom and on all sides of the CPU for sufficient air flow. Do not place the CPU on a cushioned or carpeted surface as it will restrict air flow into the bottom of the CPU, and may cause overheating.

Place the monitor on top of the CPU, and plug one end of the coiled cable into the rear of the monitor and the other end into the rear of the monitor controller. Place the keyboard in front of the CPU, and connect the coiled cord to the connector on the lower right front corner of the CPU.

Connect the power cord into the receptacle in the left rear of the CPU, and determine that the power switch is turned off (white dot is <u>not</u> pushed in). Then plug the power cord into a three prong 110V properly grounded wall receptacle. If power from the wall is erratic, or a proper earth ground is not provided, the system may not operate properly.

Phase	printed on screen	system activity
Power up	initial banner	MOM ROM initializes the system console
Test	1	Initial diagnostics pass
Configure	2	Found Boot-Device
Load	3	Boot program is loaded
Boot OS	4	Boot starting to load Kernal
Boot Complete	5	Kernel loaded
Kernal Started	6	Execute init program
System Initialized	7	Init complete
Execute Command File	8	Shell starts command file
System running	9	Power up complete

Table 4-1
Power on Sequence

POWER ON

Turn on the power switch on the left rear of the CPU, and wait approximately 10 seconds for the monitor to warm up. Adjust the brightness control on the top of the monitor until the characters are clearly visible, and the background around the characters is not green.

The screen will display the message "Fortune Systems 32:16 Please Wait". During the power on sequence a number from 1 to 9 is be displayed as each step in the process is completed. (see table 4-1)

Date and Time

When the system displays a date and time menu, enter the correct information as requested, and <RETURN>. The system will then display the date and time again. If it is not correct, answer no and renter the correct information. If it is correct, answer yes, and <RETURN>. If the date and time are correct, or if it is not needed, select the displayed date and time by pressing the <Cancel/del> key.

Login

Log into the system as "manager". The system will then display the global menu (Figure 4-1). This is the master entry point into all the system applications programs and utilities. The system "manager" login is for maintenance of system files and user capabilities, and for installation, removal, duplication, or maintenance of system application software. As such, the system "manager" should never be a user of system applications.

POWER OFF

The system must be powered off in an organized manner to keep from destroying system data files or software. There are three ways to execute the system power off routine

From the Global Menu

Select "S2" System Management. When the system management menu is displayed, select "30" for shutdown. The system will then ask for confirmation, enter "yes". The system will then shutdown the hardware and software, and end with a prompt to turn off the power.

From the login prompt

At the login prompt type in "shutdown". The system will ask for confirmation, enter "yes". The system will then shutdown the hardware and software, and end with a prompt to turn off the power.

In FOR:PRO

Enter the command "shutdown" at the dollar sign ($) or number sign (#) prompt. Exercise care when entering commands within the operating system as data can easily be destroyed without proper knowledge of the command syntax and operating system structure. (See Chapter 3) If you are unable to shutdown the system from the system prompt, try holding down the control (ctrl) key and press "d". This should return you to the login prompt or a menu, where you can continue to shutdown. If neither of the above works, type in "sync" twice, (wait for the prompt after each) and power the system off.

THE MENUS

The system menus are designed to give the user easy access to the operating system without using the operating system command syntax. The following menus are used when repairing or reconfiguring the system, and are explained in sufficient detail to allow the proper configuration and repair of the system.

F O R T U N E S Y S T E M S G L O B A L M E N U

BUSINESS APPLICATIONS	PROFESSIONAL TOOLS	OFFICE AUTOMATION TOOLS
B1 Business Systems	P1 Multiplan	E1 Fortune:Word
B2 Business Surveys	P2 Color Graphics	E2 Record Processing
B3 Business Graphics	P3	E3 Automated Calendar
B4	P4	E4
B5	P5	E5
B6	P6	E6
COMMUNICATIONS	**TRAINING AND EDUCATION**	**SYSTEM TOOLS**
C1 Async	T1 Topic Introduction	S1 System Utilities
C2 Bisync	T2 Amusements	S2 System Management
C3 Local Network	T3 Operator Training	S3 Languages
C4 X.25	T4 C.A.I. Training	S4 IDOL
C5 SNA/SDLC	T5 Demonstrations	S5 Product Maintenance
C6	T6	S6

Fortune Systems Corporation Press <HELP> For Assistance
Enter Selection & Press <RETURN>:

Figure 4-1
The Global Menu

THE GLOBAL MENU

The global menu is the central point from which all applications are accessed (Figure 4-1). To select an application, the user can enter the characters to the left of the desired function, or use the directional keys to guide the cursor to the desired location. When the proper application is highlighted, depress the <EXECUTE> key, and the first menu of the selected application will be displayed.

The Maintenance Menu

The maintenance menu displays the system configuration information stored in EAROM. System configuration parameters such as SIO and keyboard port speeds, type of flexible disk drive, location of the system boot program and the name of the file to be booted. To display the maintenance menu, power on or reset the system and hold down <Cancel/del> until the menu appears. A typical maintenance menu is shown in figure 4-2.

```
      Copyright (c) Fortune Systems, Rev. 1.0

F1  Change front port speed          2400
F2  Change back port speed           9600
F3  Change power-up action           Boot up
F4  Change boot device               WD Boot, Drive 0
F5  Change boot program number       0
F6  Change floppy drive 0 type       Tandon
F7  Set boot file name               hd02/unix
F8  Read settings from EAROM
F9  Save settings to EAROM

    EXECUTE
    HELP

            Type any highlighted key

         EAROM has been changed 4 times
```

Figure 4-2
The Maintenance Menu

Maintenance Menu Field Definitions

F1 Baud rate for the keyboard port. Not changed.
F2 Baud rate for the SIO port. Set accordingly.
F3 Defines power up action. not normally changed
F4 Defines boot device. Hard disk or Floppy controller
F5 Defines boot program. Usually 0 not normally changed
F6 Type of floppy drive. Tandon - Shugart
F7 Defines boot file name. Set accordingly.
F8 Reads current settings stored in EAROM.
F9 Writes settings on screen into EAROM.

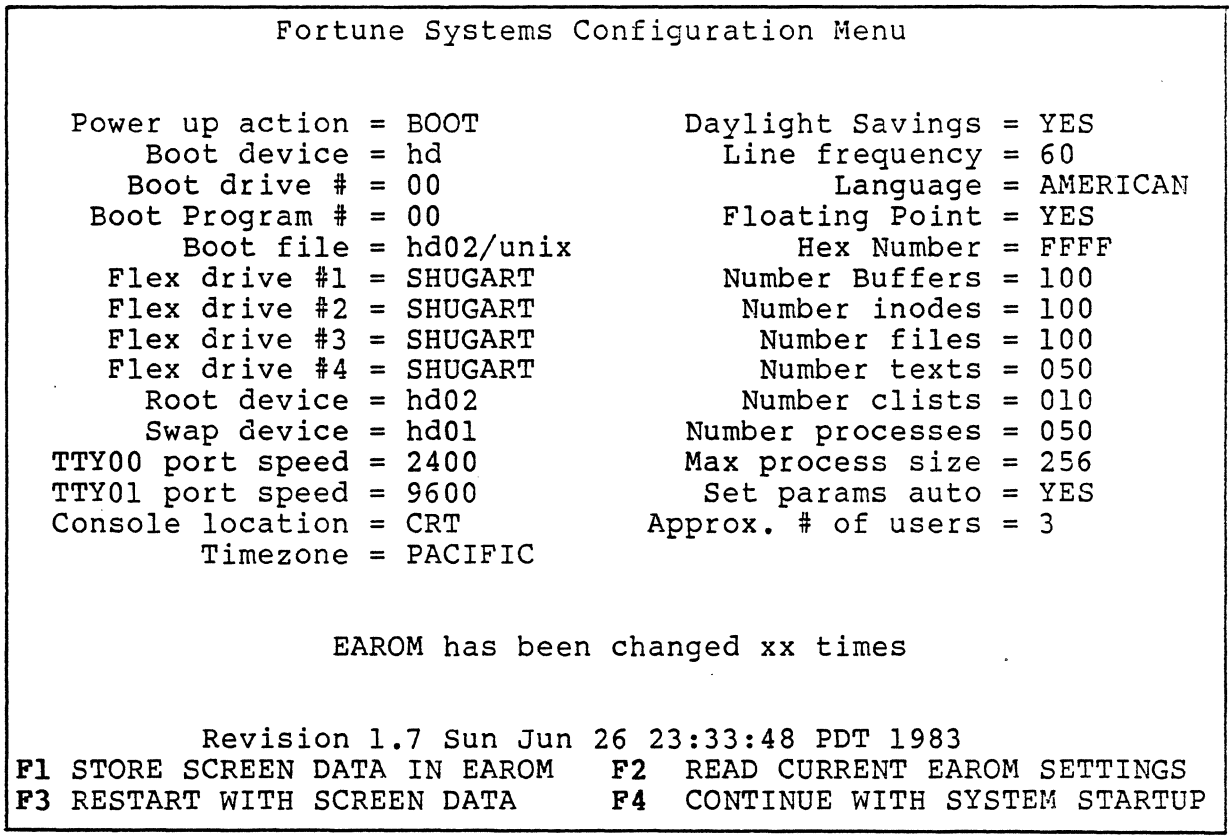


Figure 4-3
Configuration Menu

The Configuration Menu

The configuration menu defines parameters of the system which normally do not change unless the system configuration is changed. The menu is used during a cold boot of the system to redirect the root and swap areas of the system to the floppy disk. A typical configuration menu is shown in Figure 4-3.

To access the configuration menu from hard disk, enter the boot file name "hd02/sa/reconf" at F7 of the maintenance menu, and press <EXECUTE>.

To access the menu from flexible disk, load a disk with the /reconf program on it, (cold boot disk 1) and enter the boot file name "fd02/sa/reconf" at F7 of the maintenance menu, and press <EXECUTE>.

Configuration Menu Field Definitions

Power up action - the process the machine will perform when it is first powered up. Boot will load the program pointed to by the other boot parameters shown below. Show this menu will display this menu after power up. Be a terminal will cause the system to act as a terminal to a device connected to a communications port.

Boot Device - which type of device contains the boot program: hard disk, floppy, etc.

Boot drive # - which drive contains the boot program: 0, 1, 2, or 3.

Boot Program # - several boot programs can exist on a specific drive. This parameter defines which program will be used.

Boot file - The boot file name. Usually "hd02/unix".

Flexible drive #0, 1, 2, 3 - identifies to the system, the type of flexible drive being used.

Root Device - the device which will contain the operating system files. Usually hd02.

Swap device - the device which will contain the swap space for the operating system, usually hd01.

TTY00 port speed - The speed of the keyboard port 2400 baud.

TTY01 port speed - The speed of the SIO port.

Console location - which device on the system will receive system error messages. usually set to CRT.

Timezone - Pacific, Mountain, Yukon, GMT, etc.

Daylight savings - yes or no.

Line frequency - power line frequency 50 or 60 hertz.

Floating Point - is floating point allowed on your system.

Hex Number - maximum size of floating point integer.

Number buffers, number inodes, number files, number clists, number processes, max process size - If "set parameters auto" is yes, these values are calculated from internal variables in the operating system. If "set parameters auto" is no, these parameters define the size and structure of the file system. Defining these parameters effectively requires an intimate knowledge of FOR:PRO. If these parameters are not set properly, the system may not operate, or will operate inefficiently. If these parameters are in doubt, contact software support at the 800 number.

Approximate # of users - enter the appropriate number of users.

CHAPTER 5

SYSTEM PERIPHERALS

THE FORTUNE INTELLIGENT WORK STATION

The Fortune Intelligent Work Station is an additional system terminal when connected to a multi-user Fortune System through the SIO port or CommA or CommB communications interface boards. The terminal (Figure 5-1) consists of a CRT, logic board, power supply and a keyboard.

The CRT is identical to the CRT used in the monitor assembly in the system console except that the upper and lower shell assemblies are coated with a conductive coating for decreased EM/RF interference. The operation is identical to that of the system monitor assembly. The contrast adjustment potentiometer is located on the left front side of the logic board and can be adjusted through the cooling vents in the front of the terminal.

The keyboard assembly is identical to the main console keyboard.

The logic assembly contains a Z-80A microprocessor, 8K bytes of RAM, and two Dual Asynchronous Receiver/Transmitter (DART) chips, one port for the keyboard, and three RS-232C serial I/O ports on the rear of the chassis. Table 5-1 shows the switch settings to control power source type, parity, baud rate, and stop bits.

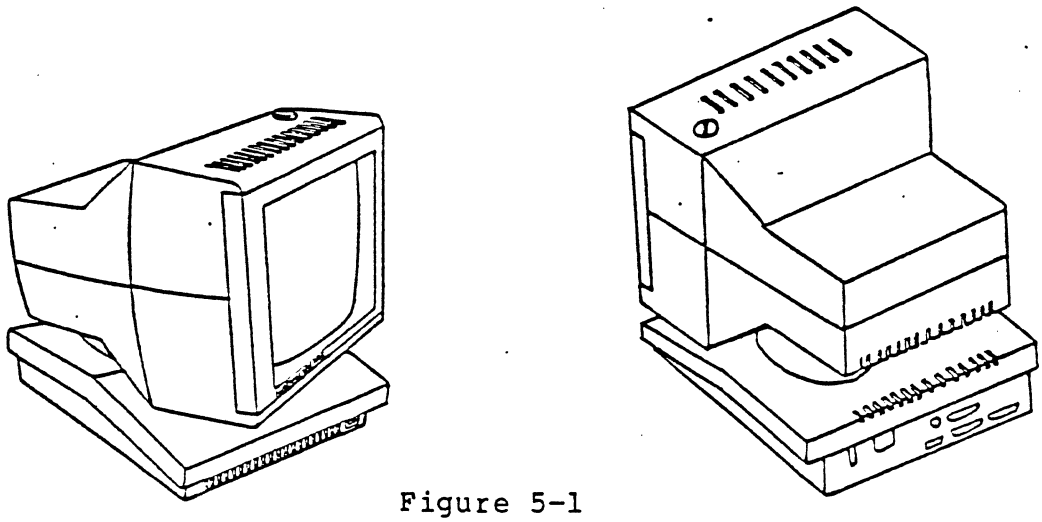


Figure 5-1
The Intelligent Work Station

The host processor is connected to one of the RS-232C ports on the rear of the workstation. The remaining two ports are for future use, and are not currently supported. One has been identified for use with a printer, while the other has not been assigned.

The workstation power supply provides ± 12 VDC and +5 VDC to power the terminal. There are no field adjustments for the power supply. The power supply is protected by a 3 amp fuse.

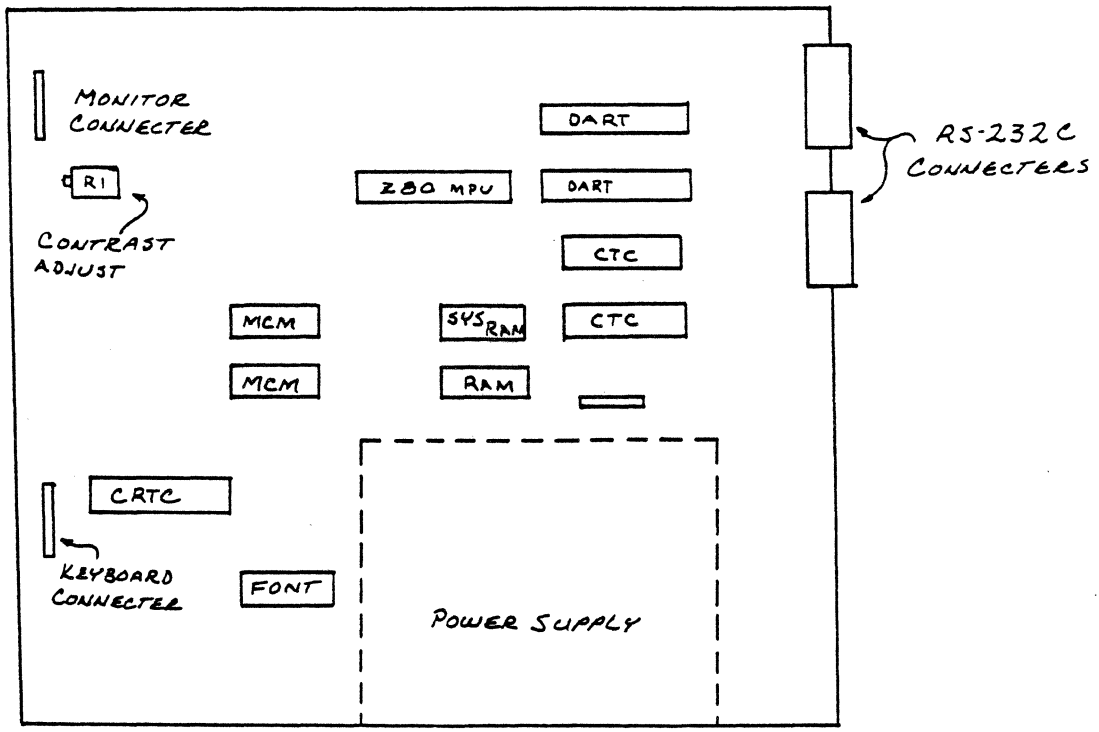


Figure 5-2

Fortune Intelligent Work Station
Logic Board Component location

Table 5-1

Fortune Intelligent Workstation
Switch Settings

Switch Number								Function
1	2	3	4	5	6	7	8	
D								60 HZ Power source
U								50 HZ Power source
	D	D						No parity (space)
	U	D						No parity (mark)
	D	U						Odd parity
	U	U						Even parity
			D					1 Stop bit
			U					2 Stop bits
				D	D	D	D	50 baud
				D	D	D	U	75 baud
				D	D	U	D	110 baud
				D	D	U	U	134.5 baud
				D	U	D	D	150 baud
				D	U	D	U	300 baud
				D	U	U	D	600 baud
				D	U	U	U	1200 baud
				U	D	D	D	1800 baud
				U	D	D	U	2000 baud
				U	D	U	D	2400 baud
				U	D	U	U	3600 baud
				U	U	D	D	4800 baud
				U	U	D	U	7200 baud
				U	U	U	D	9600 baud
				U	U	U	U	19200 baud

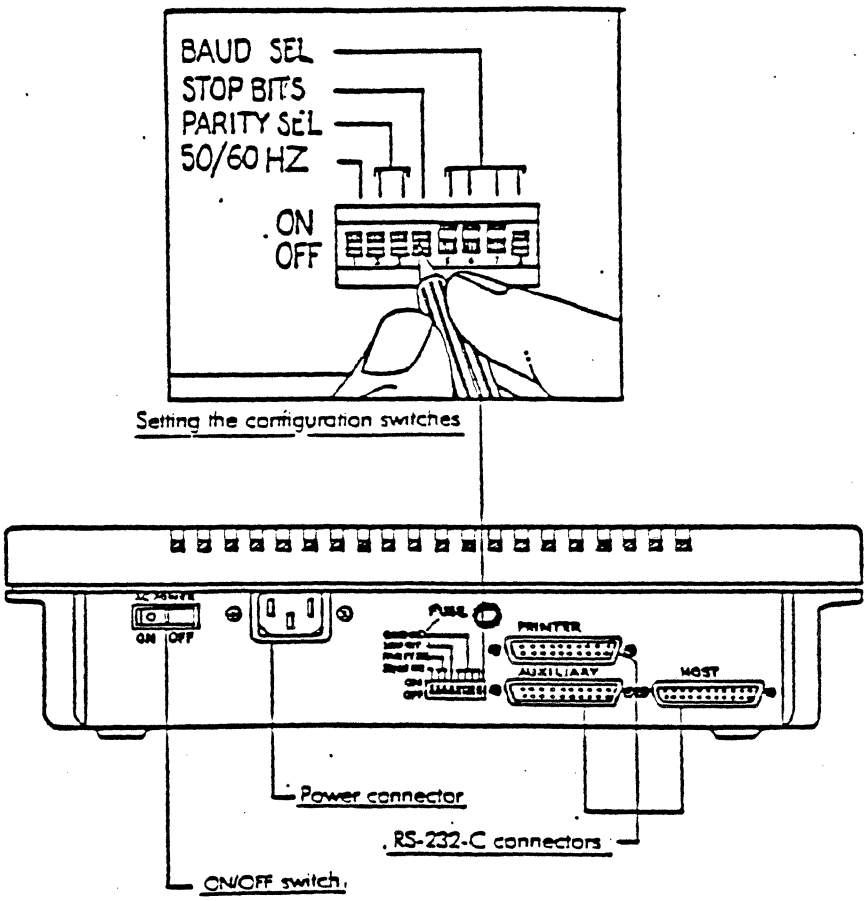


Figure 5-3

The Intelligent Work Station
Rear Panel Detail

CHAPTER 6

SYSTEM CONFIGURATION

A portion of the power of the 32:16 is derived from the capability to configure the system to meet the specific user needs. Proper configuration has been simplified through the use of configuration software during power on, and a minimum of hardware strapping. A typical system 10 is shown in Figure 6-1. The process of notifying the system that a change has been made to the configuration is explained below.

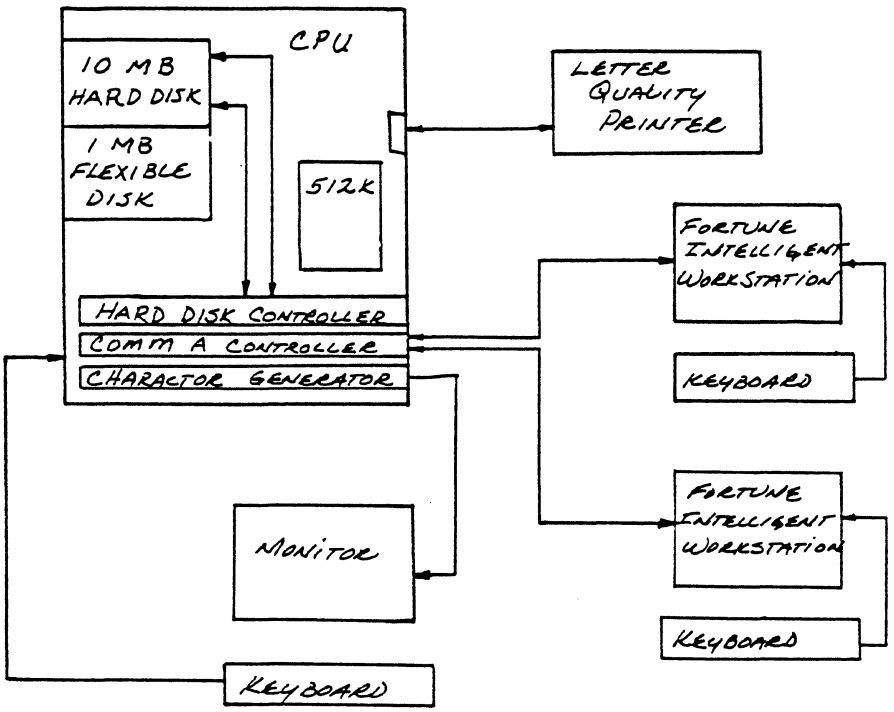


Figure 6-1
Typical System 10 Configuration

ADDING A FORTUNE INTELLIGENT WORK STATION

Connect the Intelligent Work Station cable (P/N 1000633-xx) to the desired port on the rear of the system. Select 'S2 System Management' from the Global Menu. Select '39 Change Device Connection' from the System Management Menu,

the system will display a diagram of the rear panel of the system. Enter the number of the port that the work station is connected to, followed by a <RETURN>. Select or enter the device speed and type, and the system will configure itself to add that device.

Table 6-1
Serial I/O Port Interface
EIA RS232-C

Pin No.	Circuit Name	Signal Function	Direction
1	AA	Frame Ground	
2	BA	Transmitted Data	To DCE
3	BB	Received Data	From DCE
4	CA	Request to Send	To DCE
5	CB	Clear to Send	From DCE
6	CC	Data Set Ready	From DCE
7	AB	Signal Ground	
8	CF	Data Carrier Detect	From DCE
9	-	+12 VDC	
10	-	-12 VDC	
20	CD	Data Terminal Ready	To DCE
25	-	Busy	To DCE

PRINTERS

The 32:16 currently supports several printer software drivers including those for Diablo, NEC, Qume, and IDS printers. To logically connect a printer to the system, select 'S2 System Management' from the Global Menu. Select '39 Change Device Connection' The system will display a diagram of the rear panel of the system. Enter the number of the port that the printer is connected to, and the speed of the printer (i.e., 9600 baud). The printer or printers can be connected to any system SIO port using cable P/N 1000664-XX

*** * * * * * * C A U T I O N * * * * * * ***

Pins 9 and 10 of the SIO port output ± 12 Volts DC. Connecting devices to to the system with these pins active may cause damage to the system and the device.

The printer must be configured for 'X-on, X-off software handshaking, no Parity, seven data bits, serial communications. Refer to the individual manufacturers installation manual to properly configure the printer before connecting the printer to the system.

PRINTER CABLES

Figure 6-2 is a wiring diagram and use description of the printer cable for the 32:16. Use of any other cable may not work, and can cause system or printer damage.

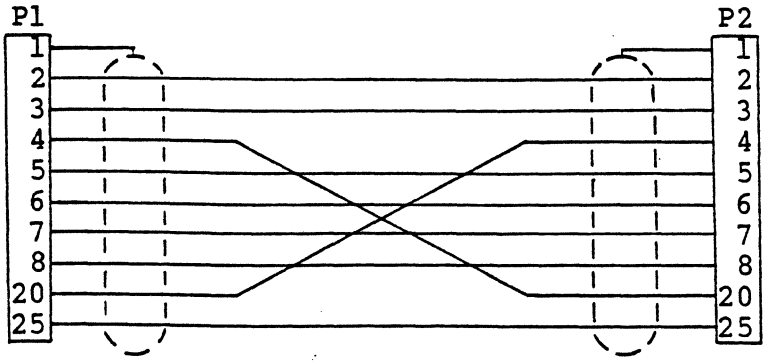


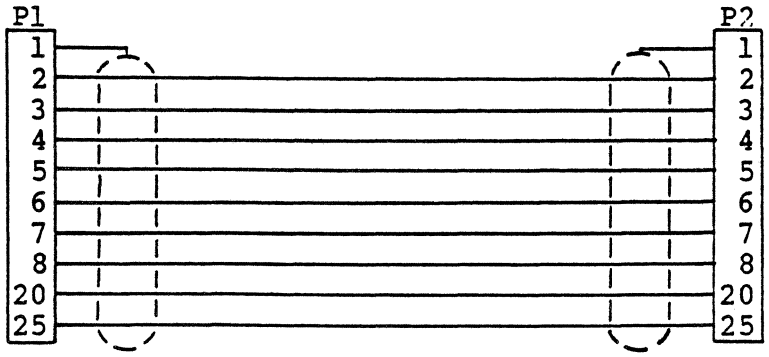
Figure 6-2
Printer Cable

Part Number	P1	P2	type of printer	Length
1000664-01	Male	Male	Letter Quality	10 feet
1000664-02	Male	Male	Letter Quality	20 feet
1000664-03	Male	Male	Letter Quality	50 feet
1000664-04	Male	Female	Dot Matrix	10 feet
1000664-05	Male	Female	Dot Matrix	20 feet
1000664-06	Male	Female	Dot Matrix	50 feet

Figure 6-2
Printer Cable
continued

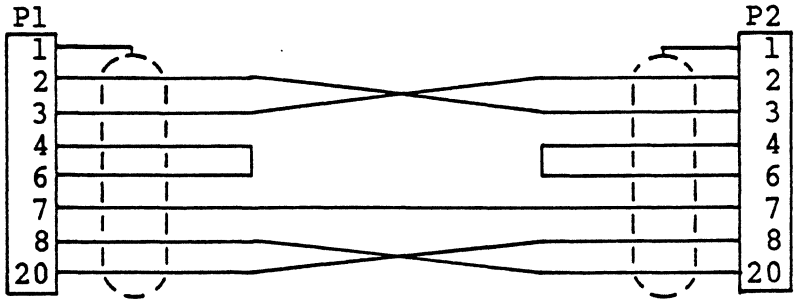
COMMUNICATION CABLES

Figure 6-3, 6-4, and 6-5 are wiring diagrams and use description of the 10000633-xx communications cables.



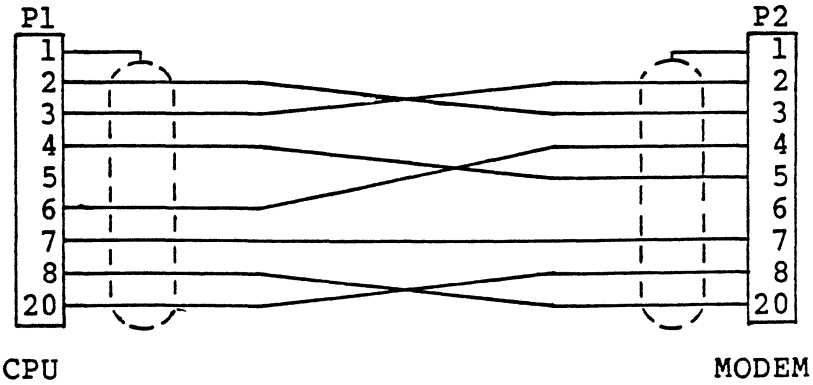
Part Number	P1	P2	Use	Length
1000633-01	Male	Male	CPU to Workstation	10 Feet
1000633-02	Male	Female	Extension Cable	10 Feet
1000633-03	Male	Female	Extension Cable	20 Feet
1000633-04	Male	Female	Extension Cable	50 Feet
1000633-08	Male	Male	CPU to Workstation	20 Feet
1000633-09	Male	Male	CPU to Workstation	50 Feet

Figure 6-3
Communications Cable



Part Number	P1	P2	Use	Length
1000633-05	Male	Male	CPU to CPU	10 Feet
1000633-06	Male	Male	CPU to CPU	20 Feet
1000633-07	Male	Male	CPU to CPU	50 Feet

Figure 6-4
Communications cable



Part Number	P1	P2	Use	Length
1000633-10	Male	Male	CPU to MODEM	10 Feet
1000633-11	Male	Male	CPU to MODEM	20 Feet
1000633-12	Male	Male	CPU to MODEM	50 feet

Figure 6-5
Communications Cable

FLEXIBLE DISK DRIVES

Up to four flexible disk drives can be installed on a system. Each disk drive is connected to the same data cable in order from drive 0 through drive 3. Strapping for the drive selection jumper block on each drive 0 through 3 is shown in figures 6-6 and 6-7. Disk drives are usually configured so that drive 0 is the first drive on the cable followed by drives 1, 2 and 3, however, they do not have to be in order.

The disk drive physically located at the end of the data cable, no matter what its address, must contain a buss terminator block in the location shown in figure 6-5 and 6-6. There must be one terminator block per flexible disk system.

To add multiple flexible disk drives to a system, changes must be made to the operating system.

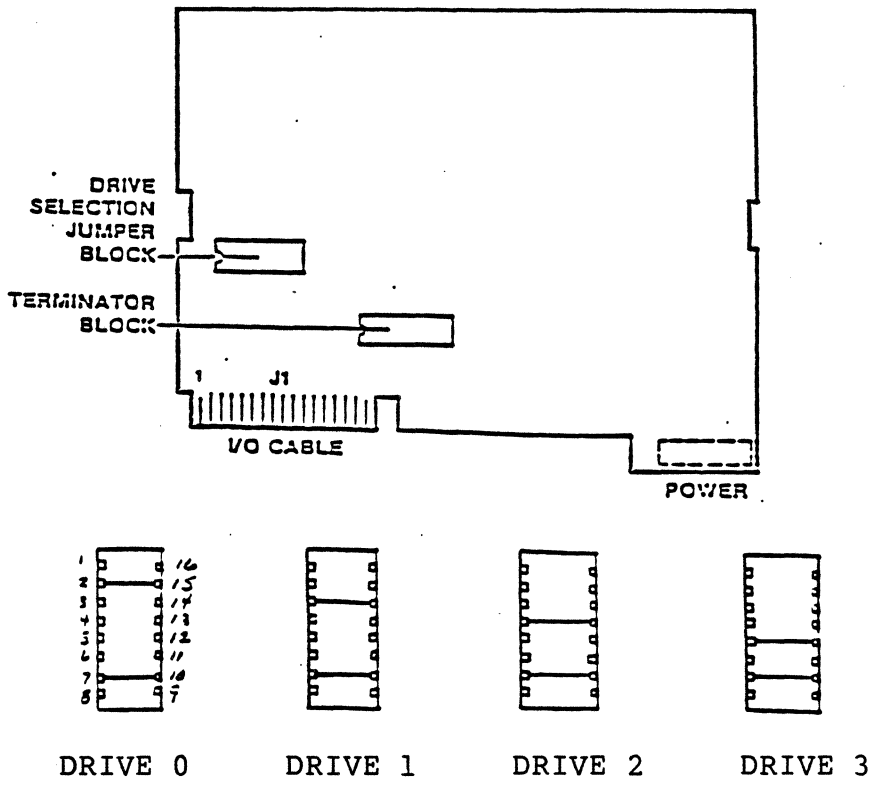


Figure 6-6
Tandon Flexible Disk
Configuration Guide

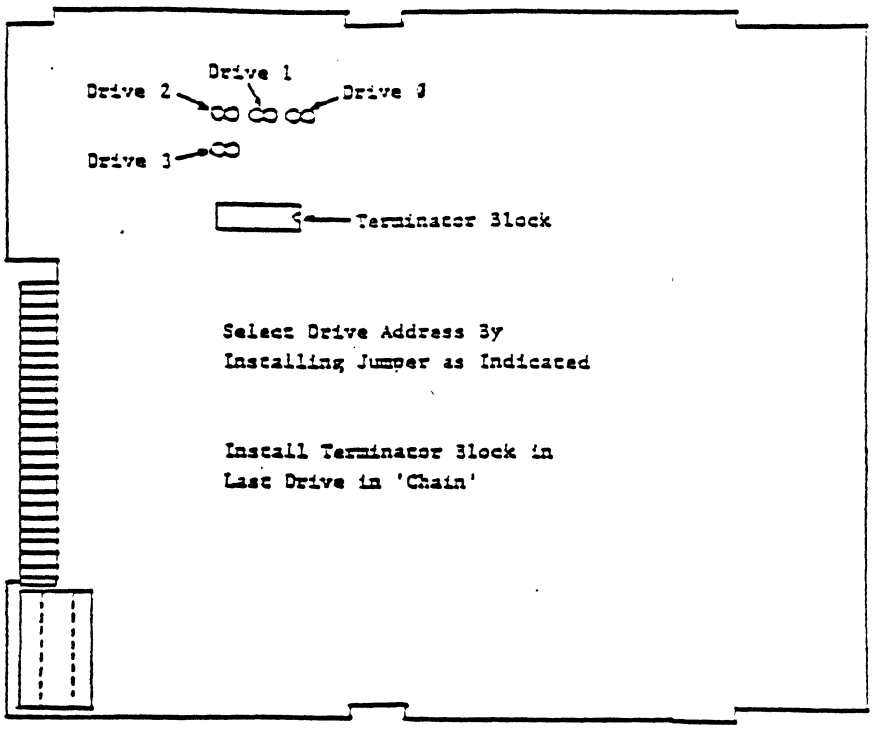


Figure 6-7
Shugart Disk Drive Configuration Guide

6

HARD DISK DRIVES

Up to four hard disk drives can be installed on a system. The disk drives can be any combination of 5MB, 10MB, or 20MB disk drives connected to the WD hard disk controller. While the WD Controller will work in any option slot, the best has been found to be slot E where there is more airflow for better cooling. Each disk drive is connected to the same serial data cable, and an individual radial cable as shown in figure 6-10.

Strapping for each disk drive is shown in figures 6-8 and 6-9. The disk drive physically located at the end of the serial cable must contain the terminator block. More than one terminator block or a missing terminator block will cause intermittent data errors

To connect multiple hard disk drives to a system, changes must be made to the operating system. Contact Software Support for guidance.

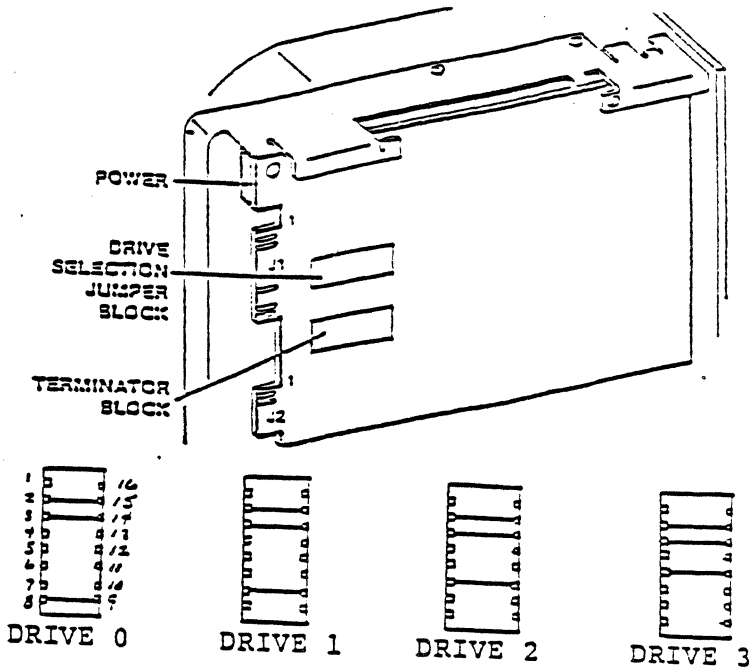


Figure 6-8
Seagate Model 506 5 MB Disk Drive
Configuration Guide

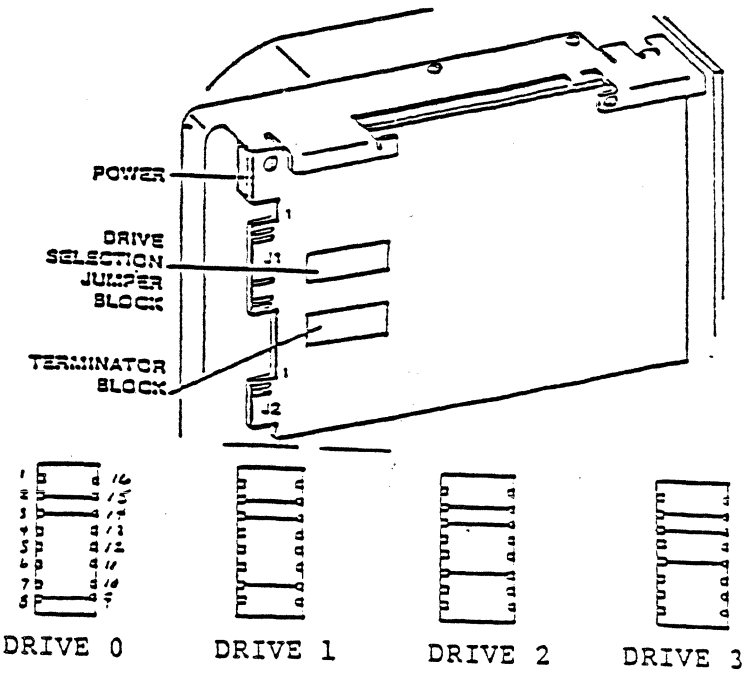


Figure 6-9
Seagate Model 412 10 MB Disk Drive
Configuration Guide

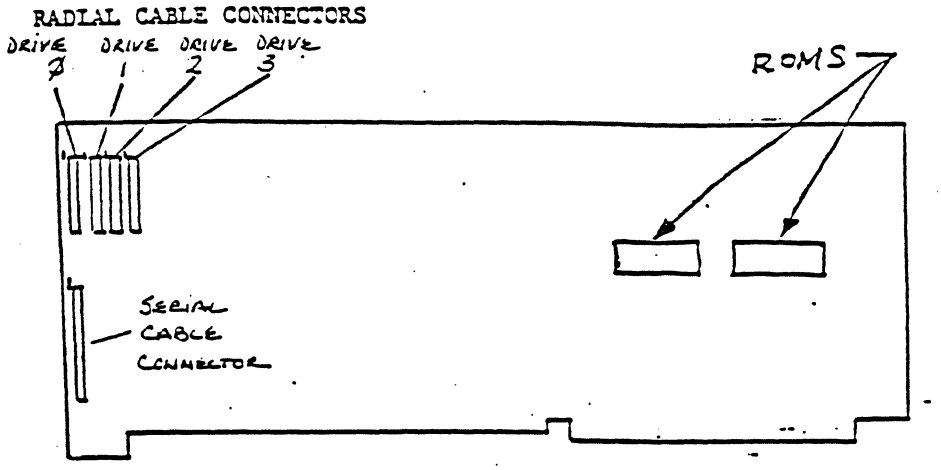


Figure 6-10
Hard Disk Controller Cable
Connection guide

POWER SUPPLY

The power supply can be configured as a 110 volt 60 cycle or 230 volt 50 cycle power supply.

For 110 volt 60 cycle operation, Install jumper W-8, install a 5 amp fuse and a 110 volt cooling fan.

For 230 volt operation remove jumper W-8, install a 3 amp slo-blo fuse, and a 230 volt cooling fan.

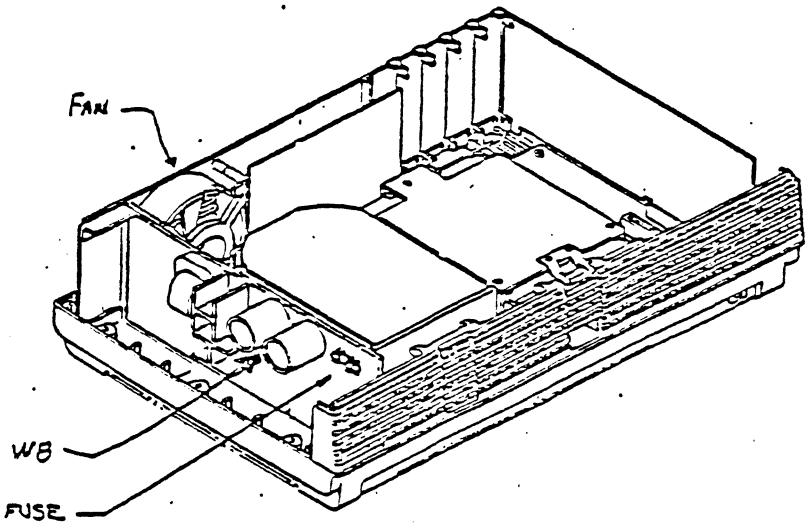


Figure 6-11
Power Supply Component Location

MEMORY CONFIGURATION

The system memory can be configured a combination of the two available memory boards, 256KB and 128KB. Table 6-2 shows the different memory sizes possible and the board location for each memory size.

Table 6-2
Memory Configuration

Memory Size	CLA Connector			
	PM1	PM2	PM3	PM4
256KB	256KB			
256KB	128KB	128KB		
384KB	256KB	128KB		
384KB	128KB	128KB	128KB	
512KB	256KB	256KB		
512KB	128KB	128KB	128KB	128KB
640KB	256KB	256KB	128KB	
768KB	256KB	256KB	256KB	
896KB	256KB	256KB	256KB	128KB
1 MB	256KB	256KB	256KB	256KB

CHAPTER 7

DIAGNOSTICS

Load Procedure

Turn on system power, or hit reset while holding down the <Cancel/Del> key. Within a few seconds, the system will display the maintenance frame, (Figure 7-1).

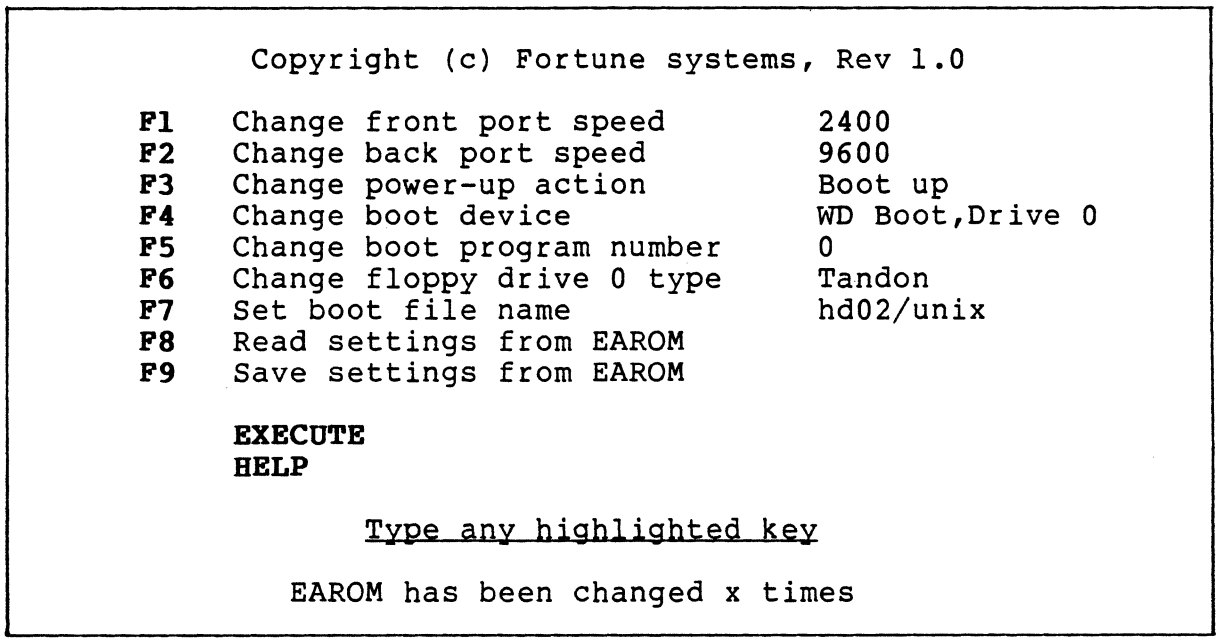


Figure 7-1
-Maintenance Frame-

Insert the diagnostic disk into the flexible drive. Press the function key <F4>, and observe that 'Change boot device' is now highlighted. Press the space bar until the boot device is changed to 'Floppy Drive 0'

Press the function key <F7>, and observe that 'Set boot file name' is highlighted, and that 'hd02/unix' is no longer displayed.

Select desired diagnostic by entering one of the file names from table 7-1. and press <RETURN> then <EXECUTE> to load the diagnostic.

Table 7-1
SYSTEM DIAGNOSTICS

Selections	Diagnostic	Page
fd02/mem	Memory	7-3
fd02/memlow	Low Memory	7-6
fd02/mmu	Memory Management Unit	7-11
fd02/kbtest	Keyboard and CRT	7-13
fd02/fdtest	Flexible Disk	7-15
fd02/hdtest	Hard Disk	7-19
fd02/coma	COMM-A Controller	7-27
fd02/comb	COMM-B Controller	7-28

MEMORY DIAGNOSTICS

The memory diagnostics (mem and memlow) provides a means to test all memory boards in a system. The user-interface is menu driven, however with the exception of the 'use quick test only' and 'check parity' options the tests are run in a predetermined order with no user interaction.

The 'memlow' diagnostic tests memory locations 0x0 thru 0x4000, while 'mem' tests memory locations 0x4000 and above. Memlow tests the area in which the diagnostic program and its data normally reside.

NOTE

The prefix 0x denotes a hexidecimal number. Numbers not preceeded by 0x are interpreted as decimal numbers by the diagnostic. Either decimal or hex numbers may be used, however all numbers returned by the diagnostic will be in hex. See table 7-2 for hex addresses and table 7-3 for decimal addresses (Page 7-9).

Loading 'mem' Diagnostic

Load the diagnostic according to the load proceedure on page 7-1, and select file name 'fd02/mem'. After a successful load the following will appear:

```
Fortune Systems Memory Diagnostic
Version 1.5 9/8/83 01:41:07

Program/data reside in ram between locations 0x0 and 0x3f04

Test Slot 1 memory from 0 to 4000(hex) (no)?
```

Test Slot 1 memory from 0 to 4000(hex) (no)? - This line is a query asking if the user wishes to run 'memlow'. The cursor will be positioned after the question mark (?) and if the user types y (yes) RETURN <cr> 'memlow' will be loaded. If the user types a RETURN <cr> only the default will be taken. (The default value is always shown in parenthesis followed by a question mark and is always used if only the <cr> key is hit).

Running 'mem' tests

See Table 7-4 (Page 7-10) for a discription of each test.

After hitting <cr> key in response to the query above, the following will appear one line at a time:

```
memory test start location (0x3f04)?
end location (0x7ffff)?
silent error reporting (no)?
pause on errors (no)?
check parity (yes)?
use quick test only (no)?

The following range of memory locations will now be tested:
   start loc = 3f04  end loc = 7ffff  # bytes = 7c0fc
hit <return> to start test or <DEL> to re-enter parameters...
```

memory test start location (0x3f04)? - Notice that the start location default value is 0x3f04, this prevents the diagnostic from overwriting itself or its data. The start location may be changed to any value above the default value.

end location (0x7ffff)? - The end location displayed is the last valid memory location as determined by the diagnostic. This is accomplished by writing a pattern to location ffffc (maximum long word memory address), and issuing a read to that location, if an error is reported the address is decremented by 128k and the above is repeated. This continues until the read is successful. The address of the first successful read is assumed to be the end location of memory.

IMPORTANT!!! Always check the end location to be sure it matches the amount of memory in your particular machine. If the end location differs, the last board (the board in the highest slot) is probably bad. An error of this type may not be detected by the diagnostics or the operating system but will probably cause system degradation (Slow operation), or other difficult to analyze problems.

silent error reporting (no)? - Setting silent error reporting may be used to set up a scope loop. During normal trouble shooting the default (no) should be used.

pause on errors (no)? - Pause on error should be set to y for most troubleshooting.

check parity (yes)? - The default value (yes) should be used. Check parity is used to test the parity checker and parity generator on the Motherboard. Bad parity is written to memory, (there is hardware to allow this) then memory is read. If the parity generator and checker are working correctly a parity error (level 7) interrupt will occur, if the interrupt does not occur an error is reported.

use quick test only (no)? - 'Quick test only' is a fast varification of memory. The default value (no) should usually be used in troubleshooting.

The last message displayed allows the user to varify the diagnostic set up before starting the actual testing.

EXAMPLE

Following is a sample error report and a discussion on how the technician may wish to set each parameter.

An end user reports that his machine is very intermittenly displaying system error message '120' (see table 3-1 on page 3-6) and the address displayed with the message always seems to be 17f02. The technician may wish to exercise that address vigoruosly to determine if, in fact, the problem is memory. The start address in this case may be set to something like 0x17f00. The adreess 17f00 was chosen because some of the tests operate on long words (four bytes) therefore the long word address which includes 17f02 begins at 17f00.

The end location in this case should be set to 0x17f03. Like the choice of the start address above this end address was chosen because it is the end address of the long word which includes 17f02. The smallest recommended address range is four bytes on the following boundaries; 0xXXXX0-0xXXXX3, 0xXXXX4-0xXXXX7, 0xXXXX8-0xXXXXb, 0xXXXXc-0xXXXXf

'Silent error reporting' - Use default <cr>.

While running memory diagnostics 'pause on errors' should usually be set to yes. An exception to this might be if the user wanted to let the diagnostic cycle for a period of time unattended, such as over night. In this particular example, with these start and end addresses, it is unlikely we would want to do this.

It is always a good idea to use the default value (yes) for 'check parity'. This allows the user to detect 'false' (non-memory) errors. In this example it is very unlikely that the problem is in the parity generator or checker, however, because it would not be confined to one address.

In this example the user may wish to run a couple of passes of 'quick test only' on the entire memory, then change the parameters and run tests on a narrow range of addresses.

Loading 'memlow' diagnostic

There are two ways to load the 'memlow' diagnostic, one is to follow the proceedure on 7-1 using 'fd02/memlow' as the boot file name, or after loading 'fd02/mem' answer y (yes) to the first query.

Running 'memlow' tests

After 'memlow' is successfully loaded the following will appear:

```
Fortune Systems Low-Memory Diagnostic
Version 1.1 9/8/83 14:03:53

silent error reporting (no)?
```

silent error reporting (no)? - The default <cr> should be used for 'silent error reporting'.

After hitting <cr> above the following will appear:

pause on errors (no)? - This parameter should usually be set to y (yes) just as we did for the 'mem' tests above.

These are the only parameters which can be set on the 'memlow' diagnostic because these tests run very quickly (approximently 25 seconds for one full pass).

Stopping the tests

As the diagnostic runs, the cursor will move left and right on the screen to indicate that the test is running. The speed of the 'heartbeat' will depend on memory size; the larger the memory the slower the heartbeat. As each test is started, the number of each test will be displayed. After each pass the following message will be displayed showing the number of times the diagnostic has been run and the number of errors encountered.

```
QP 1234567890 Pass n Pass errors = 0 Cum errors =0
```

The diagnostic cycles continuously until stopped by the user. To stop the testing hit the CANCEL/DEL key. When this key is hit the following message will be displayed:

```
Memory test interrupted.
 interrupted pass n:  pass errors = e,  cum. errors = c

Do you want to terminate this test (no)?
```

Where:

n = Pass number that was running at the time key was hit.

e = Number of errors which had occurred during that pass.

c = Total number of errors encountered from all passes run to that point.

Error Reporting

NOTE

Most error messages contain two lines of information, however with pause on errors set to yes, the diagnostic stops after printing the first line. Hit return to get the next line of the message.

Quick test

The quick test returns the following error message:

```
 unexpected parity error:  H/W addr = XXXXX, cum. parity
error = n :
error at loc XXXXX (data = dddd  expected = 5555)  :
```

Where:

H/W addr = hardware address of this error.
n = total number of errors so far in this pass.
dddd = the data read.
expected = the data written in this location (data read should be the same).

Check parity test

The check parity test returns the following message:

```
ERROR: no parity interrupt: addr = 0xXXXXX  :
```

Where:

Bad parity was written at address 0xXXXXX, but no parity error was detected when this data was read.

Tests 1 thru 8

Tests 1 thru 8 return the following error messages:

```
pass n  test t  loc xxxxx  wrote dd  read rr  xor oo  type W  :
 unexpected parity error:  H/W addr = XXXXX, cum. parity error = p :
```

Where:

n = pass number.
t = test number.
xxxxx = address of error.
dd = data written.
rr = data read.
xor = exclusive or of data written and data read.
type W = Fortune internal use only.

Test 9 and 10

Tests 9 and 10 return the same error message as the 'quick test'. (See above).

Table 7-2
Hexidecimal Memory Addresses

Range of Memory	Address Boundaries
0 - 256KB	00000 - 3ffff
256KB - 384KB	40000 - 5ffff
384KB - 512KB	60000 - 7ffff
512KB - 640KB	80000 - 9ffff
640KB - 768KB	a0000 - bffff
768KB - 896KB	c0000 - dffff
896KB - 1 MEG	e0000 - fffff

Table 7-3
Decimal Memory Addresses

Range of Memory	Address Boundaries
0 - 256KB	000000 - 262143
256KB - 384KB	262144 - 393215
384KB - 512KB	393216 - 524287
512KB - 640KB	524288 - 655359
640KB - 768KB	655360 - 786431
768KB - 896KB	786432 - 917503
896KB - 1 MEG	917504 - 1048575

Table 7-4

TEST DESCRIPTION

Test Q	-	Part 1 - Writes 5555 to memory and checks it, then writes aaaa to memory and checks it. Part 2 - Ones and zeros walked through memory.
Test P	-	writes parity errors into locations in memory and tests to see if errors are detected during read cycle
Test 1	-	Cambridge pattern 00 written to even bytes ff written to odd bytes
Test 2	-	Address pattern Least significant byte of address written to memory
Test 3	-	Alternate ones and zeros aa written to each byte
Test 4	-	Address inverse pattern logical NOT of test 2
Test 5	-	Alternate zeros and ones 55 written to each byte
Test 6	-	All ones
Test 7	-	Inverse Cambridge pattern logical NOT of test 1
Test 8	-	All zeros
Test 9	-	Bit crosstalk pattern One bit is set and written to all even bytes, while its inverse is written to all odd bytes. Eight passes are used, with bit shifting for each pass.
Test 10	-	Inverse bit crosstalk pattern logical NOT of test 9

Loading mmu Diagnostic

Load diagnostic according to the load procedure on page 7-1, by selecting file name 'fd02/mmu'. Refer to Table 7-2 (Page 7-9) to verify that the end location is correct, and press <RETURN>. The diagnostic will then load each memory location with a test pattern, and then check the information it has loaded. Select the default values, and start the test by pressing <RETURN> after each question. The MMU diagnostic takes between 5 and 30 seconds to run, and will display the following message when complete

```
mmu pass n: total cumulative errors = x
```

The mmu test will run continuously, reporting errors as they occur. At the end of each pass or when the diagnostic is interrupted by <CANCEL/DEL>, the error statistics are printed in the following format:

```
mmu pass P: total cumulative errors = E
  S seg errs: N mapping, N no r/o trap,
                         N r/o trap/write
  (Virt addr: and VA, or VO)(Phys: and PA, or PO)
```

As of the end of pass P, there have been E total errors. The second line is repeated for each segment that has had errors, where S is the segment letter, and N is the number of errors of each type. If there have been any mapping errors, the third line will be present, and displays anded values to show bits common to the addresses with errors, while the ored values show all address bits involved with any addresses with errors.

ERROR MESSAGES

The Error messages in table 7-5 contain the following variables:

Segment	Address (in Hex)
T = Text Segment	VA = Virtual Address
D = Data Segment	VD = Data read thru VA
S = Stack Segment	PA = Physical Address
X = Non-implemented segment	PD = Data read thru PA

Table 7-5

ERROR MESSAGES

ERROR MESSAGE	MEANING
ERROR--no trap on write to read-only segment (S seg)	A write was attempted to a read only segment and no trap occurred
ERROR--trap occurred (S seg, r/o) but write was not suppressed	A write was attempted to a read only segment and a trap was generated, but the hardware did not prevent a write.
ERROR--can't restore location PA	After a read-only segment check data was not restored. Re-run the memory diagnostic.
S seg PARITY ERROR: Virtual (VA); Physical (PA)=(PD)	A parity error occurred during the test of VA, which corresponds to PA. Data read from PA was PD
S seg error: virtual (VA) = VD Physical (PA) = PD	An MMU mapping error occurred. VA should map to PA, and VD should equal PD
Trap S seg ERROR: Virtual (VA) (VA) = VD; physical (PA) = PD	An MMU trap occurred where one should not have happened
No trap S reg ERROR: Virtual (VA) = VD Physical (PA) = PD	An MMU trap did not occur where one should have.
Unexpected bus error Hit DEL	An unexpected bus error or parity error occurred. Press <CANCEL?DEL> to continue
Unexpected parity error pc = PC, location = AA	Parity error occurred at AA. Program Counter = PC

Loading kbtest Diagnostic

Load the diagnostic according to load procedure on page 7-1, by selecting file name 'fd02/kbtest'. This diagnostic is used to verify that the monitor and keyboard subassemblies are working properly.

Running kbtest

The CRT Scroll Test

The first message after loading the test will ask if you wish to do the CRT Scroll test. If you answer yes (hitting RETURN defaults to yes) the next message will ask you if you have a domestic keyboard, for domestic systems the default is RETURN, if you answer no an international CRT test will run.

The CRT Scroll test displays a line of characters, and then rolls the line up the screen. If there are any bad bits in the monitor controller RAM, the characters will change as they roll up the screen. Improperly displayed characters can be an indication of trouble in the monitor controller, monitor, CLA or interconnecting cabling.

After the scroll test runs the diagnostic will say 'Hit any key to continue'. The next message will ask you if you wish to do the attribute test. Default, (RETURN) causes this test to run.

The CRT Attribute Test

This test displays the attributes in different combinations to insure that each will operate. When this test finishes you will be asked to hit ESC to continue, then you will be asked if you wish to do the keyboard test.

Keyboard Test

The first message will ask you to enter the keyboard type. The valid types are listed below:

AM - American
BR - British (U.K.)
FR - Francaise
DE - Deutsch
IT - Italian
SV - Sverige
NO - Norge
SR - Swisse - Romande
SD - Schweiger - Deutsch

If an error is made on this selection, you can exit the keyboard test by hittin SHIFT/NUMERIC KEYPAD RETURN.

An outline of the keyboard will be displayed, as you press a key that location on the outline should change to the letter on the key top. **NOTE** - Be sure to read the directions at the top of the display.

Driver Test

This test allows you to check the keyboard 'bell'. Each time you hit a key the alarm sounds. Hit ESC key to exit.

Cursor Positioning Test

This test places an 'X' in every screen position to test the cursor positioning logic of the monitor controller. This test is also very useful for CRT alignment and focusing.

Exiting the test

At the end of the Cursor Positioning Test the 'boot' message will be displayed allowing the user to boot the next program as desired.

FLEXIBLE DISK DIAGNOSTIC

Load the diagnostic according to load procedures on page 7-1, by selecting file name 'fd02/fdtest'. The following tests will verify that the flexible disk subsystem is operating properly. Optional tests are listed in Table 7-6, and are for more specific troubleshooting. If an error is encountered during the execution of the following tests, the flexible disk drive, CLA, or cable will usually repair the fault.

Initializing the Flexible Disk Controller

Enter the command 'init'. Each time the flexible disk diagnostic is loaded into the system, the flexible disk controller must be initialized.

Formatting a disk

The ability to format a disk indicates that the disk is turning, and that the heads can be moved.

The scratch disk must be certified for 96 tracks per inch, soft sectored, dual density, double sided, 80 tracks per side. If this or any other test fails, another disk should be substituted and the test retried to verify the integrity of the media.

*** * * * * * W A R N I N G * * * * ***

Formatting any diskette will always destroy
all data on the diskette.

Insure that the diskette you are using is not a
customer data or applications diskette

*** * * * * * * * * * * * * * * * * * * ***

Enter the command 'format' and press <RETURN>. Verify that the scratch disk has been inserted into the drive, and that the interleave factor is 2 by pressing <RETURN> after each prompt. The diagnostic will format the disk and prompt for another command when completed.

Write Cycle Test

This test will write a test pattern to each track and sector, and then read that information back off the disk 5 times and compare it to the original test pattern written to the disk. The test will continue to read and write the disk until interrupted by pressing <CANCEL/DEL>. Five complete passes of the write cycle test indicates that the flexible disk is working properly

Enter the command 'write cycle'. Select the proper test values by pressing <RETURN> in response to each question, and start the test. At the end of each pass, the system will display the number of passes completed, and a cumulative error count. Halt the test at any time by pressing <CANCEL/DEL>.

Verification of Buffer RAM

Enter the command 'write ram'. Select the default value to write data into the RAM. The diagnostic will then ask what data is to be written into each RAM location. Select the value 0xaa for the first test, then the reciprocal value 0x55 for the second test.

Enter the command 'read ram'. Press <RETURN> to scroll through each 256 location presentation until all 2K of buffer is read. Each of the locations shown on the screen should contain the same value. If not, the CLA is bad.

Optional Commands

Commands listed in Table 7-6 are used for more specific testing and where appropriate, are grouped with commands with which they are usually associated.

Table 7-6

Additional Commands

Command	Comments
help	displays a menu of all possible commands
recalibrate	relocates the read/write heads to track 0
information	general information on flexible disk diagnostic operation

Table 7-6 (Continued)

Command	Comments
environment	Provides information on chip status, current drive selected, current block size, mode of operation (polled vs. interrupt).
exit	Exit diagnostic and return to boot prompt.
specify	Disk head actuator step rate in 2ms increments. Range is from 1 - 15. Select 13.
seek	Moves the heads to the track and side specified.
read id	Reads the current position of the read write heads.
write	Writes data pattern selected to the specified track, side and sector.
read	Reads the track, sector and side specified
write cycle	Writes a test pattern to selected tracks, then reads and compares the data to verify accuracy. Test runs until interrupted by <CANCEL/DEL>
read cycle	Reads all blocks on the diskette and checks for correct 'CRC' characters (data integrity). No data compares are made. This test may be used to check a customers diskette.
scan cycle	Same as write cycle above
seek cycle	At the step rate specified, the test moves the heads to designated tracks and side for a selected number of test cycles. Default values are 10 tracks to be tested, for 10 cycles, at a step rate of 13 (26 ms) in the following order: track 0, side 0 - track 79, side 1 track 10, side 0 - track 70, side 1 track 20, side 0 - track 60, side 1 track 30, side 0 - track 50, side 1 track 40, side 0 - track 41, side 1

Table 7-6 (Continued)

Command	Comments
drive sense	Display status for selected drive.
drive select	Change drive under test (0-3)
drive <number>	Current drive selected is (0-3)
interrupt mode	Current mode is interrupt or polled
interrupt enable	Selects interrupt mode
interrupt disable	Selects polling mode

HARD DISK DIAGNOSTIC

The hard disk diagnostic provides a means to verify that the hard disk system is working properly. The Sequential or Random Protect test is used to read and write all disk blocks, while ensuring the integrity of customer data stored on the disk. The Sequential or Random Read Test also checks data integrity on the hard disk, but does no writes. This test runs much faster than Protect and is therefore a very good quick disk verification test. Using any other test under hdtest for the purpose of identifying a field replaceable unit is both unnecessary, and may cause data to be destroyed.

Loading hdtest

Load the diagnostic according to the instructions on page 7-1, and select 'fd02/hdtest'. After the diagnostic is loaded, the Fortune Diagnostic Main Menu (Figure 7-2) will be displayed.

```
Fortune Diagnostic Main Menu                    PARM TYPE = DEC
                                                  ADDRESS = LOGIC
                                                  HISTORY = OFF
                                                DISP UPDATE = ON

                                                     SLOT = E
                                                   DEVICE = RIGID
                                                DRIVE TYPE = A05
                                                CONTROLLER = WD
                                                 # OF CYLS = 153
                                                # OF HEADS = 4
                                                BLKS/TRACK = 17
                                               BYTES/BLOCK = 512
                                                INTERLEAVE = 2
                                                   RWC CYL = 128
                                                 WPRECOMP = 64
                                                ECC LENGTH = 11

HELP   F2     F3   F5   F6  F7  F8     F9    F16
HELP FUNCTNS PARMS HIST DEV REP EDIT SEQ/RAN QUIT
```

Figure 7-2
HDTEST Main Menu

Running hdtest

The cursor will be in the far right of the screen, next to the word 'SLOT'. This refers to the location of the WD Controller card, which is always located in option slot E. Verify that 'E' is under the cursor and, if it is not, hit either the right or left arrow key until 'E' appears.

Next hit the down arrow twice (bypassing 'RIGID'). The cursor should now be positioned next to 'DRIVE TYPE'. Hit the right or left arrow until the drive type for your machine appears. (See Table 7-7 below for a discription of drive types). If the specific model of disk drive is unknown, positively identify the brand and model of disk drive before proceeding.

Table 7-7

DRIVE TYPE LIST

A10 - Seagate 10 Megabyte (ST412)
B05 - Miniscribe 5 Megabyte
B10 - Miniscribe 10 Megabyte
B20 - Miniscribe 15 Megabyte
C20 - Ampex 20 Megabyte
E15 - IMI 15 Megabyte
G25 - Atasi 25 Megabyte
H25 - Evotec 25 Megabyte
I20 - Disctron 20 Megabyte
Z05 - Seagate 5 Megabyte (ST506)
J20 - CDC 20 Megabyte
J30 - CDC 30 Megabyte
K40 - Not used
K50 - Not used

NOTE: To determine which type of drive you have check for a sticker on the rear panel of your machine. If you upgrade machine (Hard disk drive only) be sure to change this sticker to reflect the new drive type.

When the correct drive has been selected hit <EXECUTE>. The cursor will move to the bottom of the screen next to a greater than sign (>). Hit the F9 (SEQ/RAN) key and the following menu will appear:

```
   Cyclic Device Test                TEST MODE = SEQUENTIAL
                                   START BLOCK = 0
                                     END BLOCK = 9791
                                     TEST TYPE = PROTECT
                                    LOOP COUNT = 1




  BLK    HARD    SOFT    DATACMP    WRTERRS
  0      0       0       0          0
```

NOTE: The menu shown above is for a 5 megabyte (Z05) drive, the end block number will be different for other drive types.

SETTING OPTIONS AND RUNNING TEST

TEST MODE

There are two modes the tests can be run in;

1. **Sequential** starts at the block number specified in START BLOCK and runs thru the block number specified in END BLOCK.

2. **Random** runs the test in random blocks between the numbers specified in START BLOCK and END BLOCK.

You may choose Sequential or Random by hitting the **RIGHT ARROW KEY.**

START BLOCK

The Start Block may be set to any value between 0 and the last block on your particular drive. To set the Start Block type the number of the block and hit the **DOWN ARROW.** (This number need not be left justified.

END BLOCK

Set in the same manner as the Start Block.

TEST TYPE ********************CAUTION***********************

ONLY THREE TEST TYPES CAN BE RUN WITHOUT DESTROYING DATA ON THE DISK, THEY ARE PROTECT TEST, READ TEST, AND SEEK TEST. THERE IS NO NEED TO RUN OTHER TESTS, THEREFORE THEY ARE NOT EXPLAINED.

The three tests may be selected by hitting the **RIGHT ARROW.** A discription of each is listed below.

1. **PROTECT TEST** - This test reads the data from the current block, checks the CRC character and stores the data in main memory. It then writes a random pattern into the current block, reads this pattern and compares what it read with what it wrote, this is repeated 16 times. The original data is then written from main memory back to the disk. If you wish to run this test randomly see Loop Count below.

2. **READ TEST** - This test does no writing, it reads the data in the current block and checks the CRC character only. It runs much faster than the Protect test. If you wish to run this test randomly see Loop Count below.

3. **SEEK TEST** - This test checks for any head settling or seeking problems on the hard disk. It may be run **only in sequential mode,** although it preforms random seeks.

LOOP COUNT

When in sequential mode the tests will run from the Start Block thru the End Block then repeat the sequence as many times as specified in the Loop Count

When in random mode each operation decriments the loop count by one, therefore it should be set to the number of operations you wish to do. If you set the loop count to the same number as the End Block and leave the Start Block at 0 all blocks between start and end will be operated on randomly.

STARTING TEST

When the above options have been set to your satisfaction hitting **EXECUTE** will start the test. The block count in the lower left corner will display the block number as it is operated on. When the test finishes a message **'HIT ANY KEY TO CONTINUE'** will appear in the upper left corner. If you wish to stop the test at any time hit **CANCEL/DEL** and the above message will appear.

Exiting hdtest

When hdtest is running, press <CANCEL/DEL>, and wait for the system to prompt 'Hit any key to continue'. Press any key, and the diagnostic main menu will be displayed, hit F16 (QUIT) and the boot prompt will appear. When using hdtest, only power off or reset the system from the hdtest main menu or the boot prompt. Failure to do so may result in loss of data from the disk.

When hdtest finishes normally the message 'Hit any key to continue' will appear automatically.

APPROX. RUN TIMES

SEEK TEST - 5 minutes on a 10 Megabyte disk.
SEQUENTIAL PROTECT TEST - 30 minutes on a 10 Megabyte disk.
SEQUENTIAL READ TEST - 7 minutes on a 10 Megabyte disk.

NOTE: For a 5 Megabyte drive divide above numbers by 2, for a 20 Megabyte drive multiply above numbers by 2, for a 30 Megabyte drive multiply above numbers by 3. For random read or protect tests time will depend upon loop count.

HDTEST Error Messages

The purpose of hdtest is to verify the integrity of the data on the hard disk, and the ability to write and read back data in each block of the hard disk, therefore we are concerned with only two of the many possible error messages. The messages are NOT SAVED (Read Error) and WRITE ERROR.

NOT SAVED (Read Error) indicates that the data including the ID in a particular block is bad.

WRITE ERROR indicates that the controller detected an error while attempting to write to the disk.

Following is a sample error message;

+NOT SAVED 1960/D010

NOT SAVED is explained above. The plus sign (+) indicates the current error. 1960 is the block number and D010 is the status and error information from the hard disk controller. The status register, D0 in this case, means an error was detected, the drive was ready, and the seek was complete.. In this example the error register was set to 10 which says the ID for block number 1960 was not found. Below is a list of the status and error register bits and their meaning.

BIT	STATUS REG	ERROR REG
7	Error	Bad Block Detect
6	Ready	ECC Error-Data Field
5	Write Fault	CRC Error-ID Field
4	Seek Complete	ID Not Found
3	Data Request	Parity Error (Cntrlr)
2	Corrected Error	Aborted Command
1	Not Used	Track 0 Error
0	Busy	DAM Not Found

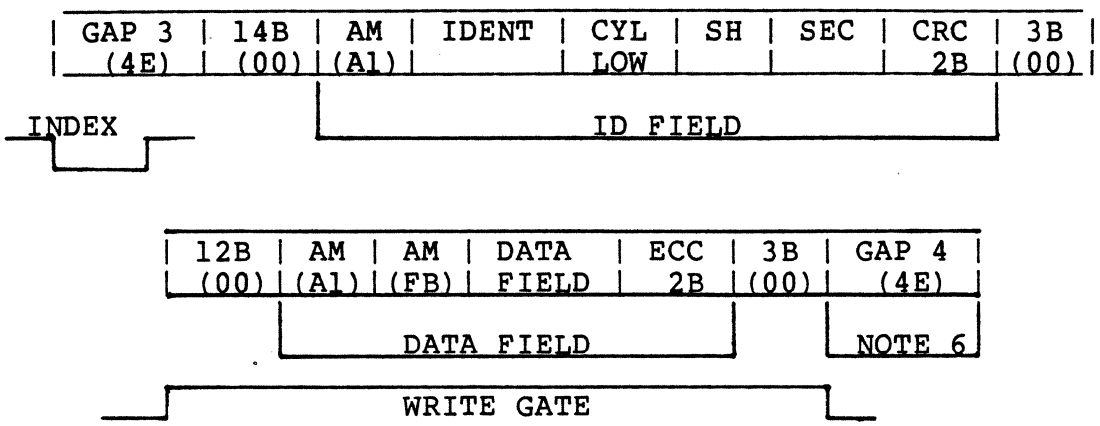
NOTE: See Table 7-8 on the following page for more details on Error Register bits.

Table 7-8

ERROR REGISTER DETAILS

Bit	Definition	Comments
7	Bad Block Detect	Indicates that a Bad Block mark was detected in the ID field. This bit does not necessarily indicate an error condition, but is set, for example when a bad spot on the disk is detected during formatting.
6	ECC Error	A read error occurred in the data portion of the indicated block.
5	CRC Error	A read error occurred in the ID portion of the indicated block.
4	ID Not Found	Indicates the ID field for this block was not found.
3	Hard Disk Controller parity error	
2	Aborted Command	Indicates the current command can not be executed because of bad status from the disk drive.
1	Track Zero Error	Indicates track zero was not detected by the drive after a restore command was executed.
0	Data Address Mark Not Found	Set during a read operation if the DAM was not detected within 16 bytes of the ID field.

Track Format



NOTES

1) 12B indicates field is 12 bytes in length.
2) (00) is the hexidecimal value written.
3) MSB of SH field is the Bad Block mark. When this bit = 1 a bad block is detected. The ID field must be good.
4) IDENT field is used to identify number of cylinders. (5 MB drive = FE, 10 MB drive = FF).
5) GAP 3 is 30 bytes in length and is written for each sector.
6) GAP 4 is 800 bytes in length and is written only after the last sector on a track.
7) WRITE GATE indicated here assumes a write command to a formatted disk.

RETRY

The Western Digital Hard Disk Controller automatically retries most errors. For example, if a CRC error is encountered during a read operation the controller will try 16 times to read the sector. If unsuccessful it will do an auto restore and an auto seek back to the affected track and try up to 16 more times. If still unsuccessful it will set the appropriate bit (or bits) in the Status and Error registers and present an interrupt to the processor.

Comm-A Diagnostic

Loading comma diagnostic

Load the diagnostic according to the procedure on page 7-1, and select file name 'fd02/coma'. After the diagnostic is loaded, the message 'Fortune Systems Comm-A Diagnostic' will appear in the upper left corner of the screen followed by the prompt;

COMM-A:

This prompt is displayed whenever the COMM-A diagnostic program is waiting for an operator command.

If you have a four port Comm-A board, and it is in slot 'c', hit the zero key and all tests on that board will be run. (One more question will be asked, 'External jumpers'. Answer no.) Otherwise continue on.

An upper or lower case H (for Help) or the HELP key from the COMM-A prompt displays the following:

```
0 = Run
1 = HW Environ
2 = SW Select
3 = Test Select
4 = Channel Options
Q = Exit
```

Where:

0 or (CR) causes all tests selected to execute. (page 7-27)
1 asks about the Hardware environment. (page 7-28)
2 displays the software select prompt. (page 7-31)
3 asks which test(s) to run. (page 7-31)
4 not implemented yet.
Q exits to 'Boot Prompt'.

Run Command

A (CR) or 0 from the COMM-A prompt will cause all tests, or those tests currently selected, to be executed. (See Test Select Command below.)

The COMM-A program is intitialized to automatically run all COMM-A tests. Currently, there are five groups or COMM-A diagnostic tests which test the following hardware functions:

1. Character size logic. Tests 1-4 of group 1. See table 1.
2. Stop bit logic. Tests 1-3 of group 2. See table 2.
3. Parity logic. Tests 1-12 of group 3. See table 3.
4. Baud rate logic. Test 1-13 of group 4. See table 4.
5. External loop back logic. Tests data drivers and receivers in the hardware via the jumpers from pin 2 to 3 of RS232 ports. See the note regarding 'External jumper' on page 7-30.

Hardware Environment Command

A '1' from the COMM-A prompt causes the diagnostic program to display several prompts which query the operator about the Hardware Environment.

The first prompt is:

Which Slots Contain COMM-A Boards?

Type H (H for help) or press HELP key. The following help prompts will be displayed:

```
ALL     = All slots A,B,C,D,E
(S)     = Single slot, Enter (A-E)
(S-S)   = From slot (S) thru slot (S)
```

Where:

```
ALL     tests slots A-E
(S)     single slot entry: 'C' means just run test(s) on
        COMM-A board in slot C
(S-S)   multiple slot entries: 'A,C-E' means slots A,C,D,E
        contain COMM-A boards.
```

The next prompt asks which channels to test:

Which Channels Are To Be Tested? (ALL;A;B;C0;C1;#,#-#,ASK)

Type H (H for help) or press HELP key. The following help prompt will be displayed:

NOTE: See page 7-34 for an explanation of channels, ports, and DART chips.

Channel Selects:

```
ALL     = All Channels 0,1,2,3
A       = Channels 0,2
B       = Channels 1,3
C0      = Chip 0 channels 0,1
C1      = Chip 1 channels 2,3
(#)     = Single channel, Enter (0,1,2, or 3)
(#-#)   = From channel (#) thru channel (#)
ASK     = Ask above channel selects on a per slot basis
```

Where:

All means test all COMM-A channels for all DART chips in all slots previously specified.

For example:

If slot C & D were selected, then channels 0-3 of slot C and channels 0-3 of slot D will be tested.

'A' means test only the A channels of both DART chips for all boards specified. There are currently 2 DART chips per board.

'B' means test only the B channels of both DART chips for all board specified.

'C0' means test only the channels of the first DART chip for all boards specified.

'C1' means test only the channels of the second DART chip for all boards specified.

```
'#'     means the channel number from 0 thru 3
'0'     means channel A of first DART chip.
'1'     means channel B of first DART chip.
'2'     means channel A of second DART chip.
'3'     means channel B of second DART chip.
'#-#'   means test channels # thru channel #.
```

For example:

'0,2-3' means test channel A of first DART chip and both channels of second DART chip.

NOTE: A mixture of '0,C1' is illegal.

'ASK' means ask the above channel prompt on a per slot basis. If ASK is entered, then the following prompt is displayed:

```
Which Channels of Slot X Are To Be Tested?
(ALL;A;B;C0;C1;#,#-#)
```

Where:

X is the slot (A,B,C,D,E).

The above definitions are the same but only on a per slot basis.

For Example:

If slots C,D where selected to be tested and ASK is entered from the channel prompt, then the following prompts will be displayed:

```
Which Channels of Slot c Are To Be Tested? (ALL;A;B;C0;C1;#,#-#)
ALL:A
Which Channels of Slot d Are To Be Tested? (ALL;A;B;C0;C1;#,#-#)
ALL:0,3
```

The Operator chose to test only channel A of both DART's in Slot c. From the Slot d prompt channel A of the first DART was selected and channel B of the second DART.

NOTE: The current channel selections are automatically displayed on the next line terminating with ':'. If a CR is entered, these default values are used.

The COMM-A program is initialized to test both channels of both DART chips of the COMM-A board in slot c.

The next prompt asks, whether external jumper(s) is (are) used.

External Jumper(s) used?

If external jumpers are used, type a y (for yes).

NOTE: 'External jumper' refers to jumpering pin two to pin three of the port(s) to be tested. Any type of jumper may be used, and allows the data driver and receiver to be tested.

Software Select Command

A '2' from the COMM-A prompt causes a prompt to be displayed which allows the operator to alter the software environment. The following prompt is displayed:

```
CR - continues, H - helps, or directly enter option
```

NOTE: This command is not necessary for normal 'in the field' trouble shooting.

Test Select Command

A '3' from the COMM-A prompt causes the following display to appear:

```
RUN TESTS? (ALL;G,ALL; G,#; G,#-#)
```

Where:

```
ALL     executes all COMM-A diagnostic tests.
G,ALL   executes all tests in group G.
G,#     executes test '#' in group G.
G,#-#   executes test '#' thru test '#' in group G.
```

PASS/FAIL Message

A PASS/FAIL message is displayed after each test completes. A brief description of the test is also included in the message. The format of the PASS/FAIL message is as follows:

```
Test N of group G, Passed. D----------D.
```

Where:

```
N - is the test number
G - is the group number
D - is up to 35 characters of test description.
```

TRANSMIT/RECEIVE Error Message

If the number of characters transmitted or received does not agree with the expected number, then the following error message is displayed:

Channel C of Slot S: Transmitted T, received R, expecting E characters

Where:

C - is the channel in error
S - is the slot in error.
T - is the actual number of characters transmitted this test
R - is the actual number of characters received this test
E - is the number of characters expected to be transmitted/received

The following tables contain the values used in each test. These tables are for Character Size Tests, Stop Bit Tests, Parity Tests and Baud Rate Tests.

TABLE 1
Character Size Tests

Group	Test Number	Stop Bits	Character Size	Baud Rate	Parity
1	1	1	5	19200	odd
1	2	1	6	19200	odd
1	3	1	7	19200	odd
1	4	1	8	19200	odd

TABLE 2
Stop Bits Tests

Group	Test Number	Stop Bits	Character Size	BaudRate	Parity
2	1	1	8	19200	odd
2	2	1.5	8	19200	odd
2	3	2	8	19200	odd

TABLE 3
Parity Tests

Group	Test Number	Stop Bits	Character Size	Baud Rate	Parity
3	1	1	5	19200	odd
3	2	1	5	19200	even
3	3	1	5	19200	none
3	4	1	6	19200	odd
3	5	1	6	19200	even
3	6	1	6	19200	none
3	7	1	7	19200	odd
3	8	1	7	19200	even
3	9	1	7	19200	none
3	10	1	8	19200	odd
3	11	1	8	19200	even
3	12	1	8	19200	none

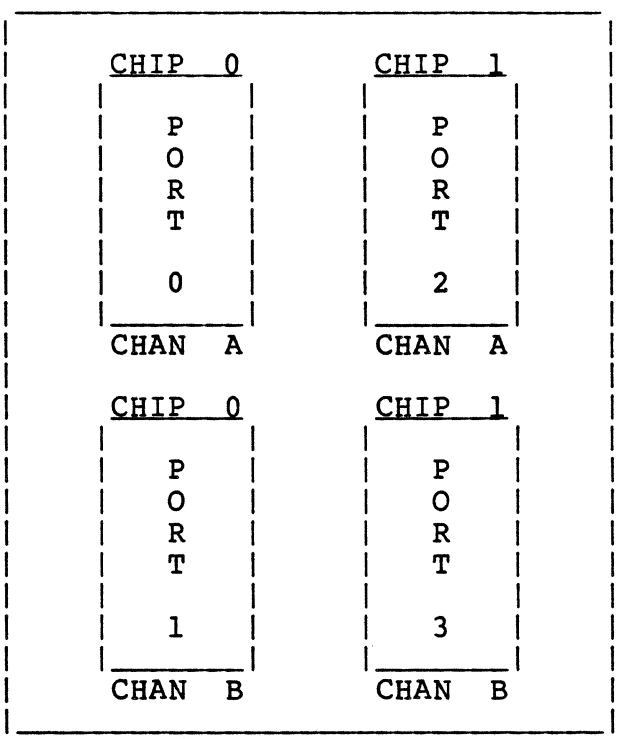
TABLE 4
Baud Rate Tests

Group	Test Number	Stop Bits	Character Size	Baud Rate	Parity
4	1	1	8	50	odd
4	2	1	8	75	odd
4	3	1	8	110.2	odd
4	4	1	8	134.5	odd
4	5	1	8	150	odd
4	6	1	8	300	odd
4	7	1	8	600	odd
4	8	1	8	1200	odd
4	9	1	8	1800	odd
4	10	1	8	2400	odd
4	11	1	8	4800	odd
4	12	1	8	9600	odd
4	13	1	8	19200	odd

Comm-A Board Layout

There are two types of Comm-A boards, two port and four port. On a two port board there is one DART (dual asynconous receiver/transmitter) chip, and on a four port board there are two DARTs. Each DART consists of two communications channels which are referred to (usually) as channel A and channel B. The DARTs on a board are referred to as chip 0 (or the first DART chip) and chip 1 (or the second DART chip). (A two port Comm-A board, of course, only has chip 0 or the first DART chip). The plugs on the back of the board into which we plug peripherals are referred to as ports and the ports are numbered 0 and 1 (for a two port board) or 0 thru 3 (for four port board). Below is a chart of this DART, channel, port concept as used by the COMM-A diagnostic.

Four Port Comm-A



NOTE: A two port board is the same as this execpt chip 1 (both channel A and B) or ports 2 & 3 are missing.

Loading comb diagnostics

Load the comb diagnostic according to the instructions on page 7-1, and select 'fd02/comb'. After the diagnostic has loaded the following menu will appear:

```
Standalone Comm-B Test & Verification package, ver 3.1 7-13-83
General command format is: <cmd> [argl] [arg2];<cmd> ... <cr>
Use the 'HELP' key to reprint this summary
a(ddr).........argl-arg5 are the option slots to test: abcde
               if no argl, option slot 'C' is selected
c(ount)........argl is the number of times to repeat each test
d(isplay)......prints all currently selected options
e(xternal).....loopback testing selected for test 'd'
-e(external)...test 'd' reverts to internal loopback SIO testing
g(o)...........executes selected tests
l(oop).........if argl is 'e', sets test to loop on first error
               'a' sets selected test(s) to loop till killed
               'f' arg sets selected test(s) to loop till first error
-l(oop)........turns off loop mode
p(ause)........on any error until the space bar is pressed
-p(ause).......turns off pause on error mode
q(uit).........exits to boot prompt ':'
r(ange)........argl is the starting word address for tests 3 and 6
               arg2 is the ending word address
               missing arg(s) default to top and/or bottom of memory
               acceptable values are 00-077777,0-32767,0x0-0x7fff
t(est).........argl,arg2 select the test range to be run
               if no arg, prints description of all tests and
               selects to run all tests. Enter test #'s 'l-d'(hex)
>
```

Running comb diagnostic

It is recommended that all tests be run with all cables to the Comm-B board disconnected. To do this it is only necessary to type 'g'<RETURN>. If all tests run successfully it is recommended that pins 2 and 3 be jumpered together and test 'd' be run. To run test 'd' in loopback mode type 'p;e;t d;g'<RETURN>. ('p' sets pause on error, 'e' sets loopback mode 't d' selects test 'd', and 'g' causes the test to br run).

Error Messages

Each test returns it's own error messages and if any test fails the Comm-B board should be replaced.

Duplicating Diagnostic Disks

The following procedure will enable you to duplicate your diagnostic disk. That portion of the following list that is in boldface type is data you must enter. All of the inputs are made after you login as '**root**'. After you login, you should see the pound sign prompt (#). Begin entry of commands below from this prompt. That portion of the list that is **not** in boldface type are messages returned to you by the operating system. Diagnostics are for your use only, and are not to be given to anyone else.

Insert your master diagnostics disk copy into the flexible disk drive and proceed.

```
# mkdir diag<RETURN>
# mount /dev/fd02 /f<RETURN>
# cp -rostV /f/* /diag<RETURN>

copy /f/README to /diag/README
copy /f/coma to /diag/coma
copy /f/comb to /diag/comb
copy /f/coma.doc to /diag/coma.doc
copy /f/fdtest to /diag/fdtest
copy /f/hdtest to /diag/hdtest
copy /f/hdtest.doc to /diag/hdtest.doc
copy /f/kbdtest to /diag/kbdtest
copy /f/mem to /diag/mem
copy /f/memlow to /diag/memlow
copy /f/mmu to /diag/mmu
copy /f/pio to /diag/pio

# umount /dev/fd02<RETURN>
```

*** * * * * * * * N O T E * * * * * * * ***
Remove the master disk from the drive, and insert a blank disk.
*** * * * * * * * * * * * * * * * * * * ***

```
# /etc/format -c /etc/disk/bootflop.conf /dev/fd00<RETURN>
# dd if=/sa/boot of=/dev/fd00 bs=1k seek=10<RETURN>

41+1 records in
41+1 records out
```

```
# /etc/mkfs /dev/fd02 740 1 10<RETURN>

isize=464
m/n = 1 60

# mount /dev/fd02 /f<RETURN>
# cp -rostV /diag/* /f<RETURN>

copy /diag/README to /f/README
copy /diag/coma to /f/coma
copy /diag/comb to /f/comb
copy /diag/coma.doc to /f/coma.doc
copy /diag/fdtest to /f/fdtest
copy /diag/hdtest to /f/hdtest
copy /diag/hdtest.doc to /f/hdtest.doc
copy /diag/kbdtest to /f/kbdtest
copy /diag/mem to /f/mem
copy /diag/memlow to /f/memlow
copy /diag/mmu to /f/mmu
copy /diag/pio to /f/pio

# ll /f<RETURN

total 188
-rw-r--r-- 1 root        301 Aug 18 09:28   README
-r--r--r-- 1 root      35584 Aug 18 13:57   coma
-r--r--r-- 1 root      21069 Aug 11 10:48   coma.doc
-r--r--r-- 1 root      25428 Aug 18 13:59   fdtest
-r--r--r-- 1 root      37712 Aug 10 22:54   hdtest
-r--r--r-- 1 root      23311 Aug 11 10:53   hdtest.doc
-r--r--r-- 1 root      16056 Aug 11 21:07   kbdtest
-r--r--r-- 1 root      10936 Aug 18 14:02   mem
-r--r--r-- 1 root       8800 Aug 18 14:02   mmu

            * * * * * * * * N O T E * * * * * * * *
           Dates times and numbers may be different
                        on your files.
           * * * * * * * * * * * * * * * * * * * *


# umount /dev/fd02<RETURN>
# fsck /dev/fd02<RETURN>
```

```
/dev/fd02
**Checking /dev/fd02
**Phase 1 Check Blocks and Sizes
**Phase 2 Check Pathnames
**Phase 3 Check Connectivity
**Phase 4 Check Reference Counts
**Phase 5 Check Free List
13 files 196 blocks 513 free

# rm -r diag<RETURN>
# sync<RETURN>
# <CONTROL D>  will return you to the login prompt
```

At this time you are finished making and checking a duplicate disk, remove your new disk and **put a write protect tab on it>**

CHAPTER 8

MODULE REMOVAL AND REPLACEMENT

Maintenance of the system has been simplified by designing modules so that they are easy to replace when a malfunction does occur. The system can be disassembled and reassembled in a very short time, so that user downtime due to hardware malfunction is reduced.

The fasteners used in the system are removed with a standard size phillips or common blade screwdriver. Screws should be tightened to approximately 30 inch pounds of torque. Excessive torque will cause threads to strip.

It should never be necessary to force or pry components apart. If it becomes difficult to remove a component, recheck that all fasteners have been removed, then carefully work the components apart.

References to direction in this chapter, such as "right" or "left", are those as seen by an operator facing the system during normal operation.

Reassembly of the system is the reverse of disassembly procedure unless noted.

All removal and replacement procedures are performed on systems with the power cord removed.

*** * * * * * * W A R N I N G * * * * * * ***

Always remove the power cord from the rear of the system before removing any cover, module, or cable. Hazardous voltages are present within the cabinet when power is applied, which can damage system components, and injure anyone working on the system with power applied.

CPU Disassembly

The following procedure is one way to remove modules from the CPU assembly, however it is usually not necessary to remove components in this exact order, i.e., the power supply can be removed without removing the front or rear panels, or the disk assembly. As experience is gained in the removal and replacement of modules, personal techniques will be improved.

*** * * * * * * C A U T I O N * * * * * * ***

Do not turn the CPU assembly on end or upside down when removing or replacing the covers. The assembly can be easily dropped or excessively flexed possibly causing damage.

1. Remove the cables to the monitor and keyboard assemblies, and set the CPU assembly on a suitable work surface.
2. Position the CPU so that one end extends beyond the edge of the work surface approximately one inch. Loosen the three captive screws in that end (Figure 8-2, item 1). Extend the opposite end of the CPU off the edge of the work surface approximately one inch and loosen the three captive screws.
3. Carefully reposition the CPU assembly on the work surface, and lift off the top cover and set it aside.
4. Position the CPU assembly so that the front extends approximately one inch beyond the edge of the work surface. Loosen the two screws at each corner of the base plate (Figure 8-2 item 2) approximately eight turns each.
5. Slip the retainer straps off each end of the front panel, open the flexible disk door(s), and lift the front panel out and away from the base plate. Disconnect the in-line connectors on the wires to the light-emitting diodes, and set the front panel aside.
6. Remove the memory card(s) and ECC card and set them aside.
7. Remove all cables from both disk drives. Be sure to note the polarity of the cables so that they can be reinserted properly.
8. Remove each circuit card from their option slots, by loosening the captive thumb screw on the rear of each option card, and lifting the card up and out. When reassembling the system, make sure that the option cards are returned to their original positions.
9. Remove four screws that hold the disk bracket assembly, (Figure 8-2, item 3) and carefully lift it out of the CPU assembly. The disk drives should be handled with care as they can be damaged by rough handling.
10. Turn the disk bracket assembly upside down on the work surface, and remove the screws which secure it to the disk drives. Remove the disk drives and set them aside.
11. Remove the flexible disk drive cable from the motherboard, and set it aside.

12. Remove the AC power plug from the fan, and slip off the ground wire(s) from the fan assembly. Gently lift the rear panel by the right end while rotating it toward the rear to disengage the panel from the base and from around the power supply. It may be necessary to loosen the power supply screws to allow enough clearance to remove the rear panel.

13. Remove the power supply connector from the motherboard by pinching the connector at each end and pulling up while holding the motherboard down.

14. Remove the two screws holding the power supply (Figure 8-2 item 4). and lift out the power supply.

15. Remove the six screws holding the motherboard to the base. (Figure 8-2, item 5)

16. Disconnect the keyboard cable from the motherboard.

17. Lift the motherboard out from the base and set it aside.

* * * * N O T E * * * *

Whenever the motherboard is exchanged, the Serial PAL (location 7D) must be removed from the old board and reinstalled on the new motherboard.

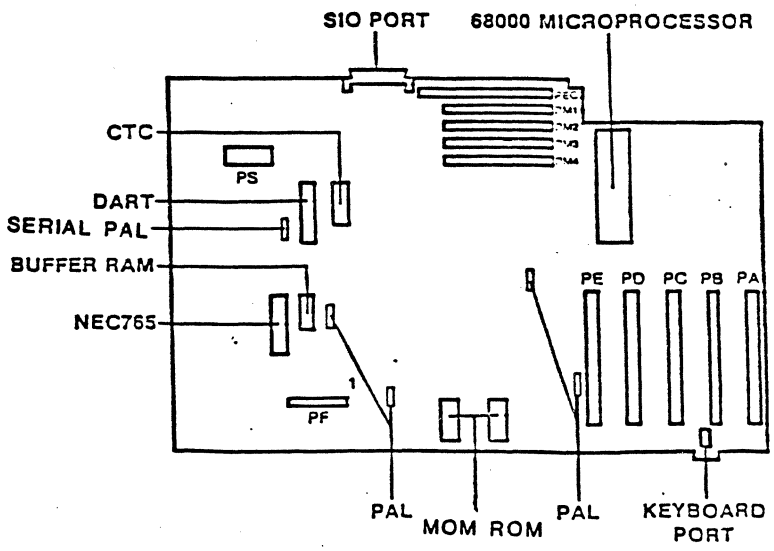


Figure 8-1
Central Logic Assembly Component Location

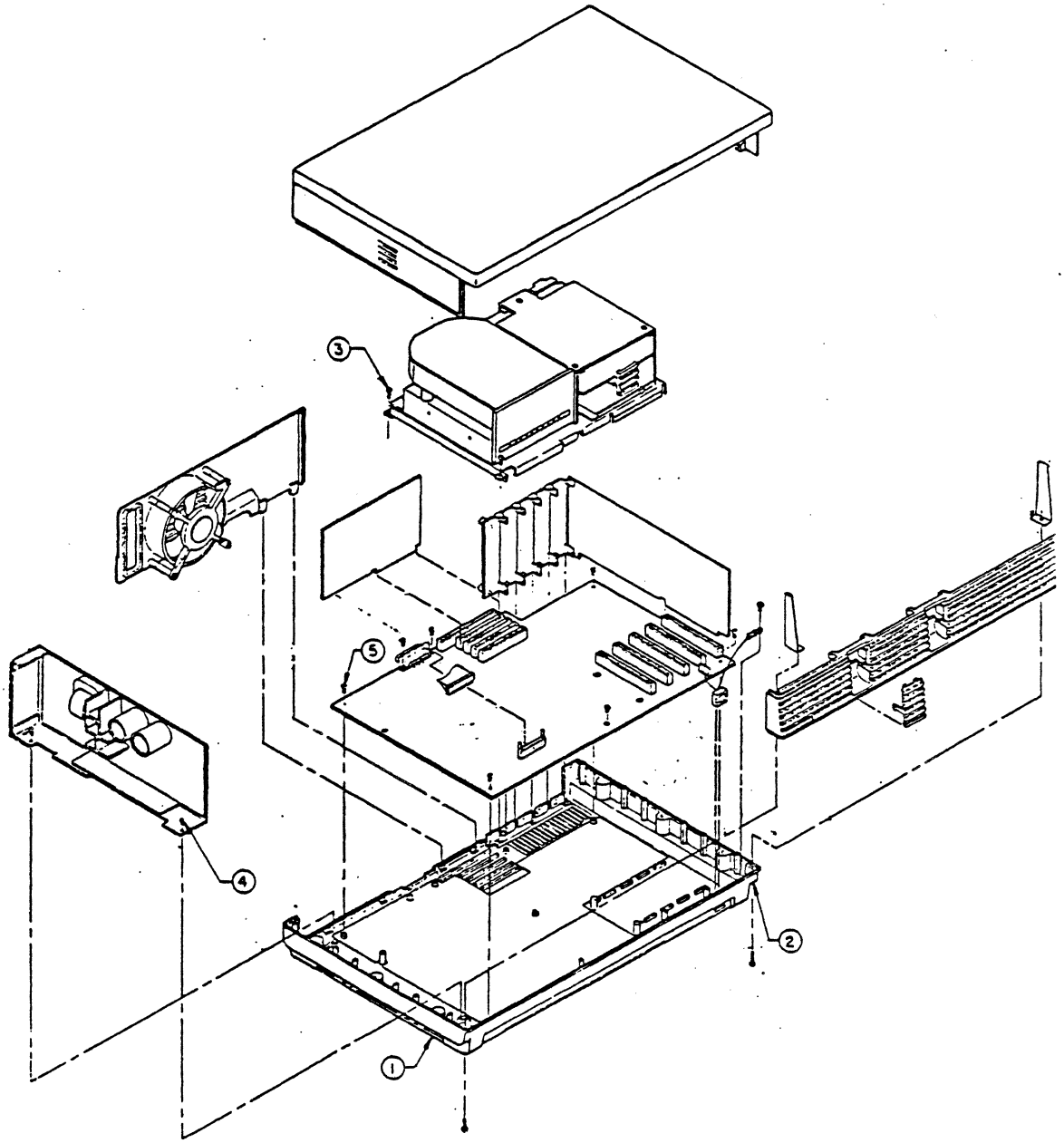


Figure 8-2
CPU Assembly Component Location

VIDEO MONITOR DISASSEMBLY

1. Disconnect the cable between the monitor and CPU.
2. Loosen the two captive screws holding the monitor shells together. (Figure 8-3, item 4).
3. Slide the upper shell up on and off of the left and right CRT mounting brackets (Figure 8-3 item 1).
4. Separate the cable to the brightness knob at the in-line connector (figure 8-3 item 2) and set the top shell aside.
5. Remove the cable from the rear of the monitor board.
6. Remove the screws holding the monitor board and Flyback transformer to the lower shell.
7. Slide the CRT and bezel assembly up and out of the lower shell, and place face down on a clean work surface.
8. Remove the four screws that hold the bezel to the CRT, and remove the bezel (Figure 8-3 item 3).

*** * * * * * * W A R N I N G * * * * * * ***

Exercise caution when handling the CRT. If the CRT is dropped or broken, there can be a violent implosion, and danger of injury from flying glass.

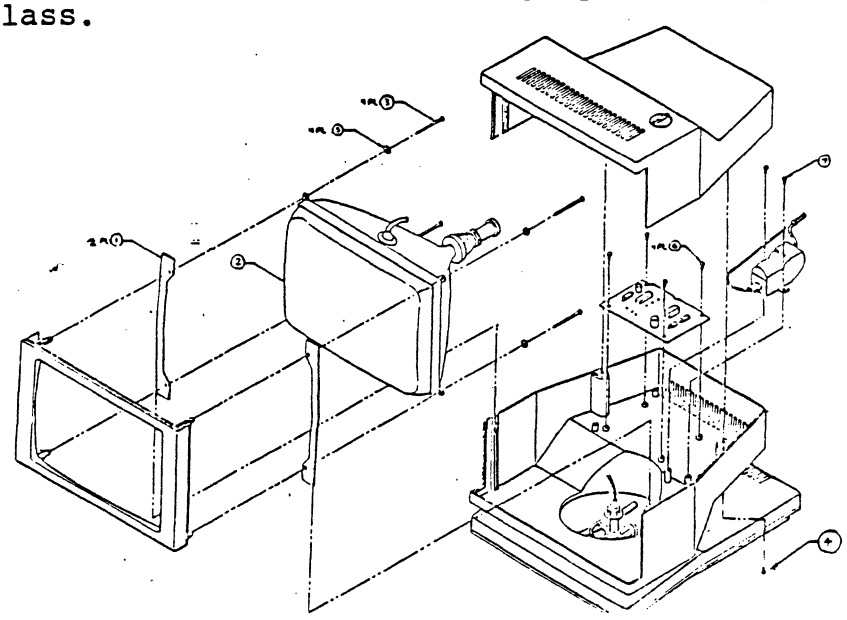


Figure 8-3
Monitor Assembly Component Location

KEYBOARD DISASSEMBLY

1. Remove the cable between the keyboard and the CPU.
2. Place the keyboard assembly face down on a suitable work surface, and loosen the four screws in the base.
3. Turn the assembly face up, and lift off the top cover and set aside. Collect and set aside the four cover screws from the base.
4. Lift the keyswitch assembly (Figure 8-4, item 1), and disconnect the ribbon cable from the keyboard electronics assembly (Figure 8-4, item 10). Set the keyswitch assembly aside.
5. Disconnect the cable from between the keyboard electronics assembly and the keyclick volume control.
6. Remove the screws securing the keyboard electronics assembly to the base, and remove the assembly.

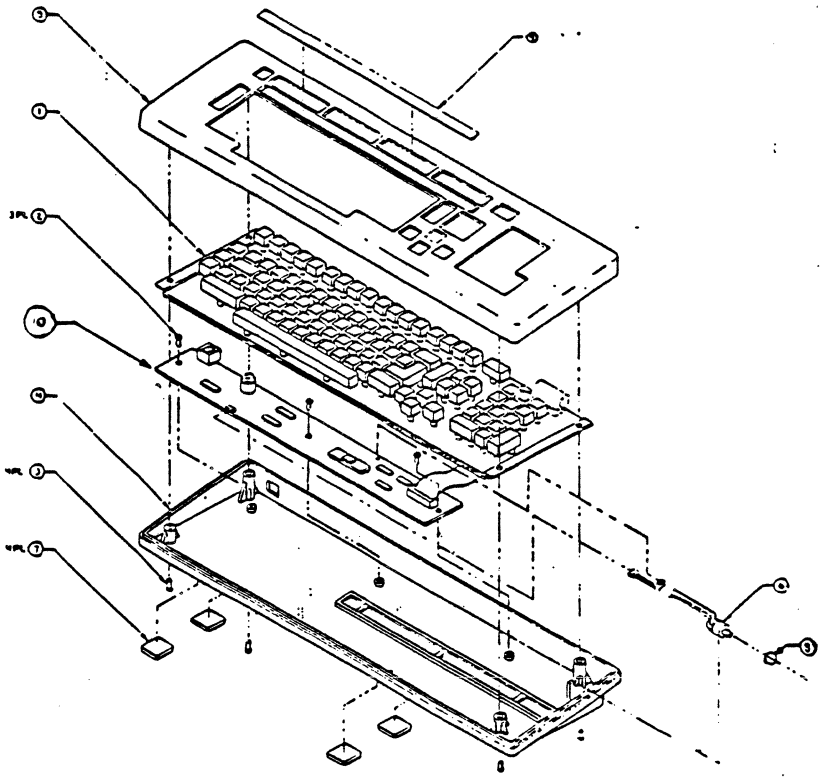


Figure 8-4
Keyboard Assembly Component Location

Chapter 9

TROUBLESHOOTING FLOWCHART

Organization

When using the diagnostic flowchart, the technician is directed through a series of decisions based on symptoms or answers to questions within decision blocks. Each decision will lead to the next logical step in the troubleshooting process.

When a decision block directs the user to another page of the flowchart, the appropriate page number and entry point on that page are given. Each flowchart entry point consists of two numbers, the top number is the exit point from the previous decision block, while the bottom number is the entry point for the next. It is therefore possible to retrace the flow through the chart.

In this example (Figure 9-1), we have come to a decision block asking if there is a raster on the monitor.

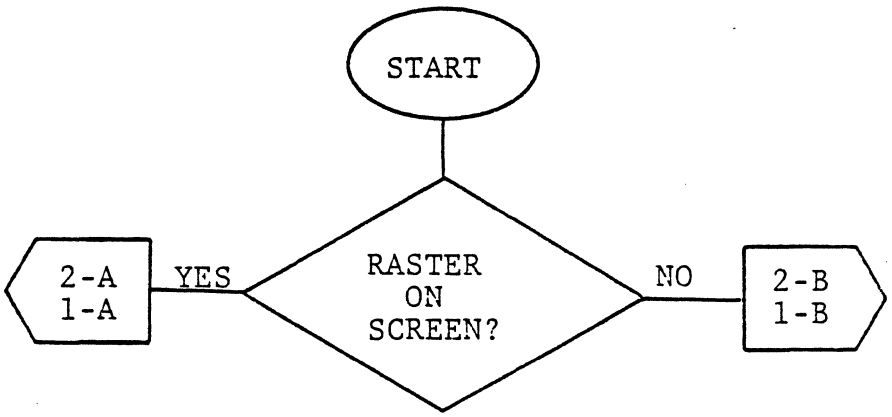


Figure 9-1

Assume that the answer is no. We are directed to go to page 2, entry point B (2-B), from page 1, exit point B (1-B) (see Figure 9-2).

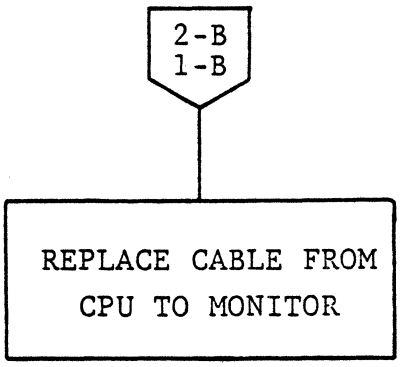


Figure 9-2

According to the instruction block in Figure 9-2, the next logical step is to replace the cable from the CPU to the Monitor. Subsequent steps will lead the technician logically through the process of identifying and repairing system failures.

Below is a legend of symbols used in the flowchart. Pay particular attention to the symbol 4 as it directs you to flowchart notes on pages 9-3 and 9-4. The notes are very important and should always be referred to as directed.

At any time you reach the 'DONE' symbol be sure to run all diagnostics and applications as may be appropriate to ensure all problems have been taken care of.

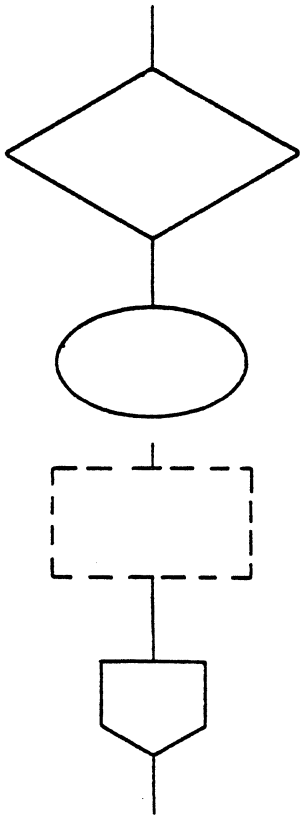
If at any time you are in doubt about the disassembly and reassembly of a part of the machine refer to Module Removal and Replacement in Chapter 8 of this manual.

LEGEND

Start Symbol Indicates the beginning of the flowchart.

Action Block Indicates that some action is to be taken at this time.

LEGEND

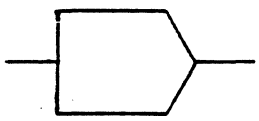


Decision Block Indicates a branch is taken based on the answer to the question in the block

Terminal Indicates the end of this path in the flowchart.

Comment Block Gives descriptive comment or explanatory note.

Entry Point Indicates entry point to current page. This symbol is always at the top of the page.



Exit Point Indicates that the current path in the flowchart exits this page and is continued at the entry point indicated by the top number.

Note Symbol Indicates that there is a Flowchart Note associated with this function. (See Flowchart notes on pages 9-4 and 9-5)

TROUBLESHOOTING FLOWCHART NOTES

Note 1 The boot message should appear immediately unless machine has been off for a period of time, in which case it will take a little time for the CRT to warm up. Be sure the intensity on the monitor is not turned down too far to be able to see the display.

Note 2 When determining if boot from hard disk is OK be sure to bring machine all the way up to the global menu. If you are unable to login, you may have a bad keyboard or keyboard cable. Before replacing either try replugging both ends of the keyboard cable to eliminate the possibility of a bad connection.

Note 3 To reconfigure hold down the <CANCEL/DEL> key and reset or power on the system. After the maintenance Frame appears release the <CANCEL/DEL> key. If the Maintenance Frame does not appear, the keyboard or keyboard cable may be bad. Disconnect and reconnect both ends of the keyboard cable to eliminate the possibility of a bad connection. For details on reconfiguring and loading diagnostics, see Chapter 7 of the Field Service Manual.

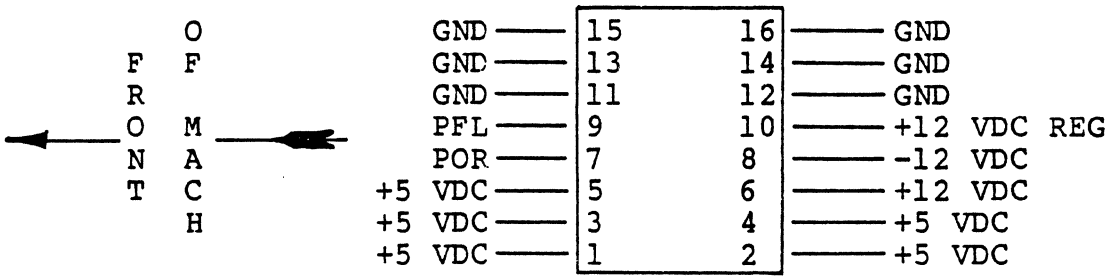
Note 4 For details on loading and running memory diagnostics see Chapter 7 of this manual.

Note 5 For details on loading and running the MMU diagnostic, see Chapter 7 of this manual

Note 6 For details on loading and running fdmenu, see chapter 7 of this manual

Note 7 If you got to this point from power on and if hitting reset clears the symptom there is a possibility that the Power On Reset (POR) signal from the power supply is not working or there is a bad connection at the CLA power plug (pin 7). If this seems to be the case try turning power off and on again, if the same thing happens, check the connector for proper seating before changing the power supply

Note 8 Following is the CLA power plug pin out. Be sure this connector is plugged into the CLA while measuring voltages, otherwise the 12 volts will read approximately 20 volts

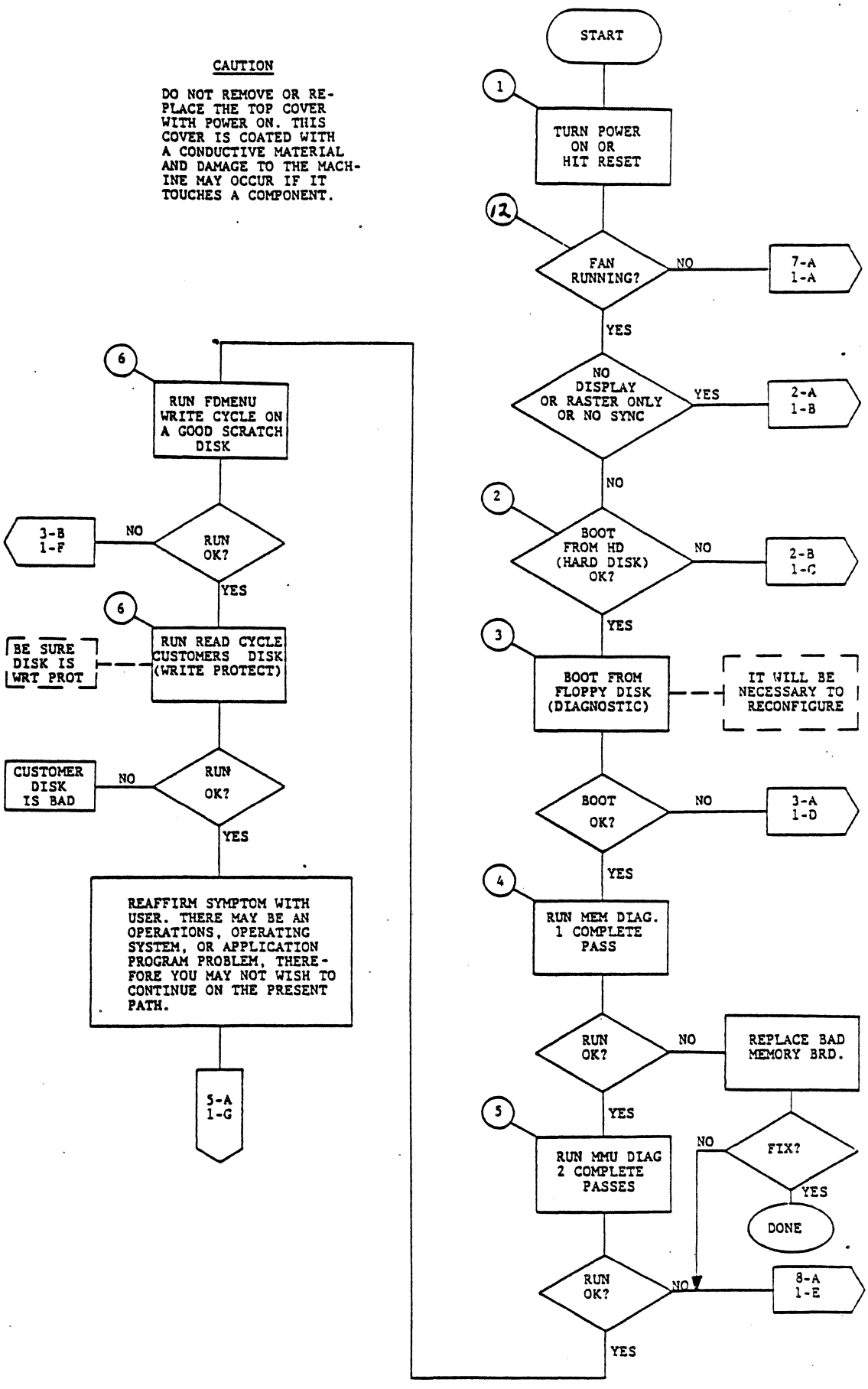


Note 9 Anytime it is necessary to replace the hard disk controller it may also be necessary to reload the software onto the hard disk. Be sure when replacing the hard disk controller that you plug the radial cable into the correct position on the controller board. See Chapter 6 of this manual.

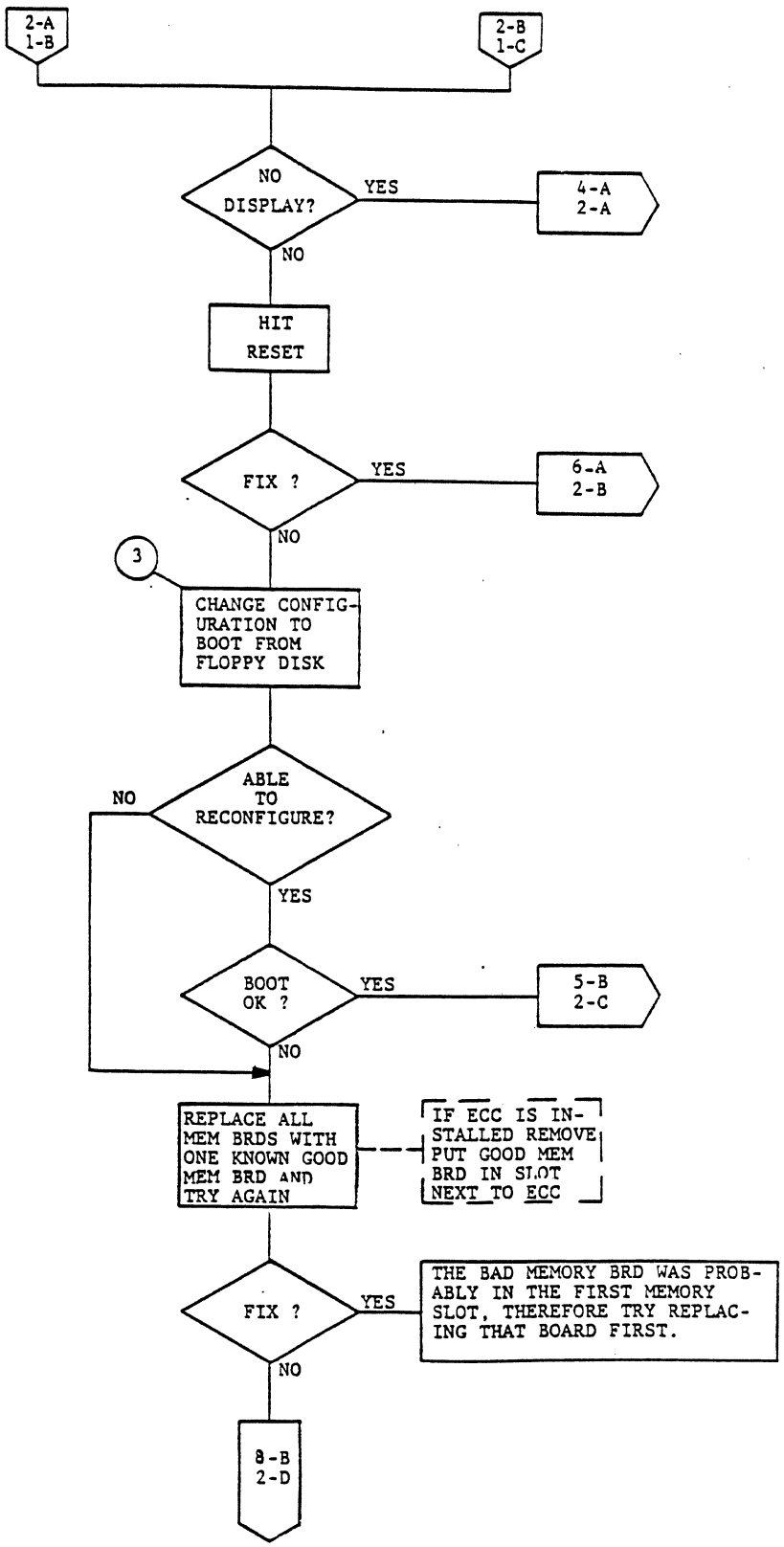
Note 10 When replacing the hard disk it will probably be necessary to format and load software onto the hard disk. Be sure the address and option jumpers are plugged correctly and the terminator is in the correct drive. See Chapter 6 of this manual.

Note 11 If entry point to this block was 8B-2D try booting from floppy again. If successful one of the option boards is probably interfering with the data or address bus. If entry was from other than noted above or if floppy boot is still unsuccessful, be sure to pull the cable off the floppy drive to eliminate it as a cause of interference.

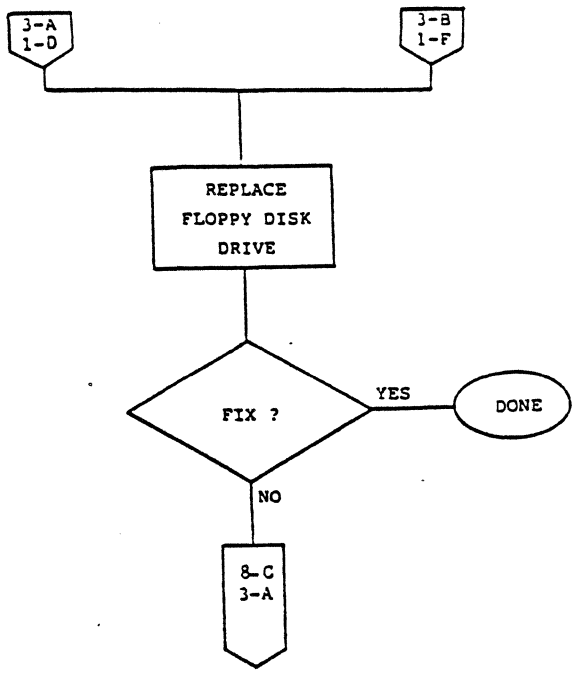
Note 12 If the answer to this decision block is yes try reseating the cable between the CRT and CPU. If this doesn't help try swapping the CRT cable with the Keyboard cable. If swapping cables fixes the problem replace the bad cable. (Which is now between the Keyboard and CPU) If neither helps, continue on to page 2A-1B.

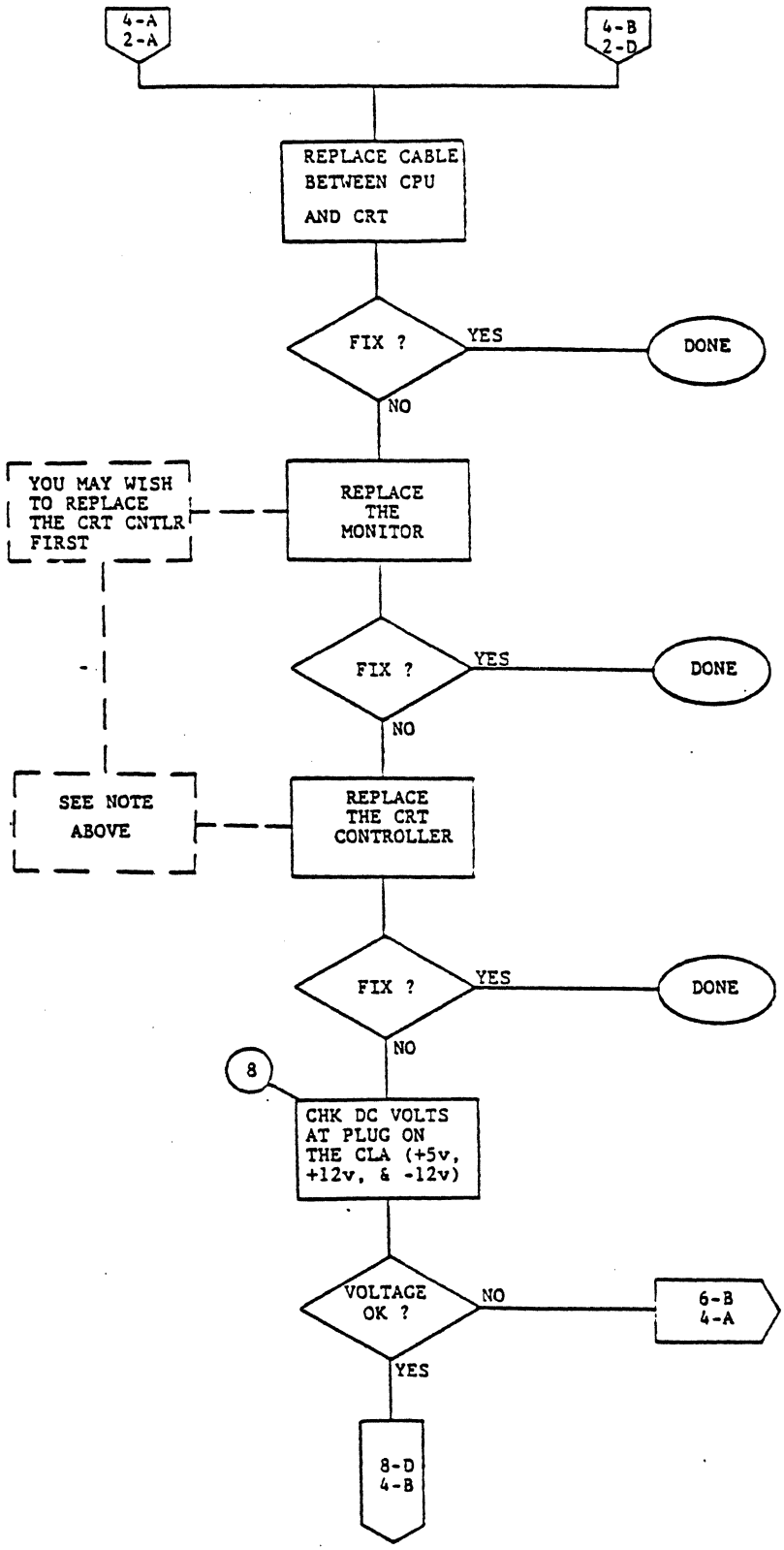


FLOWCHART - PAGE 1 - (GENERAL)

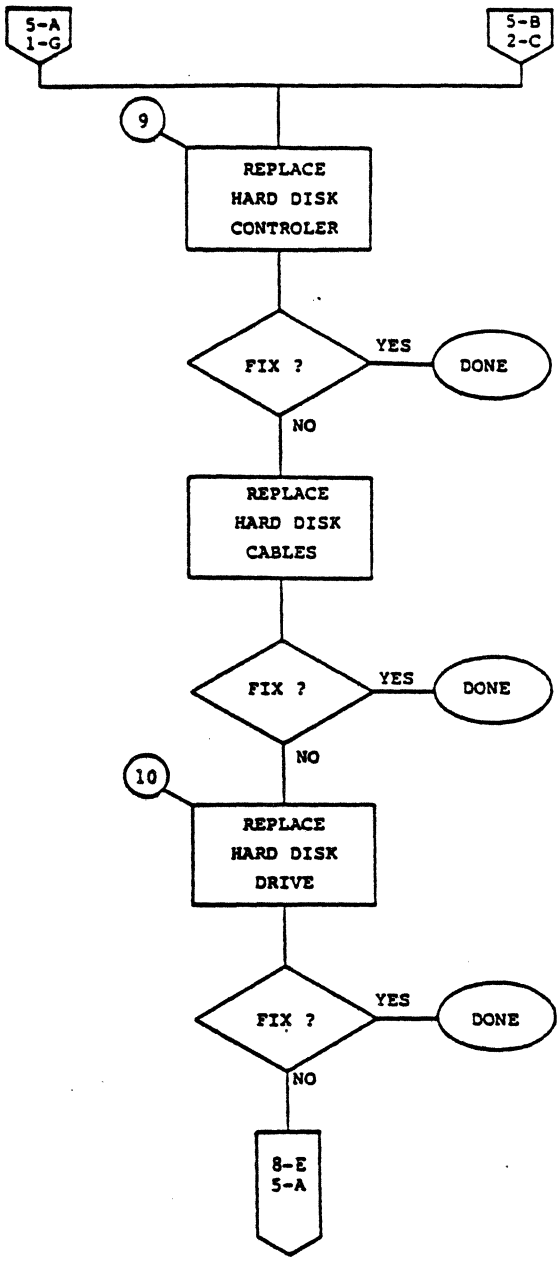


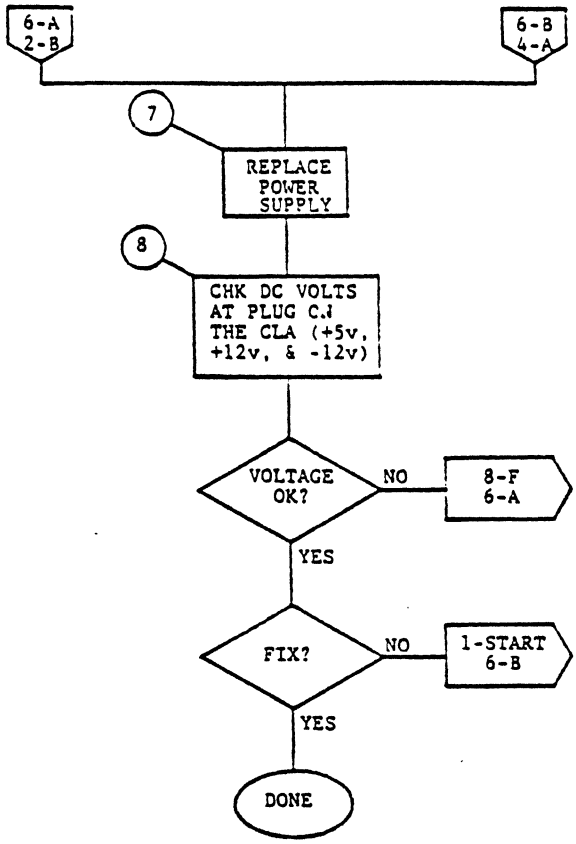
FLOWCHART - PAGE 2 - (GENERAL)

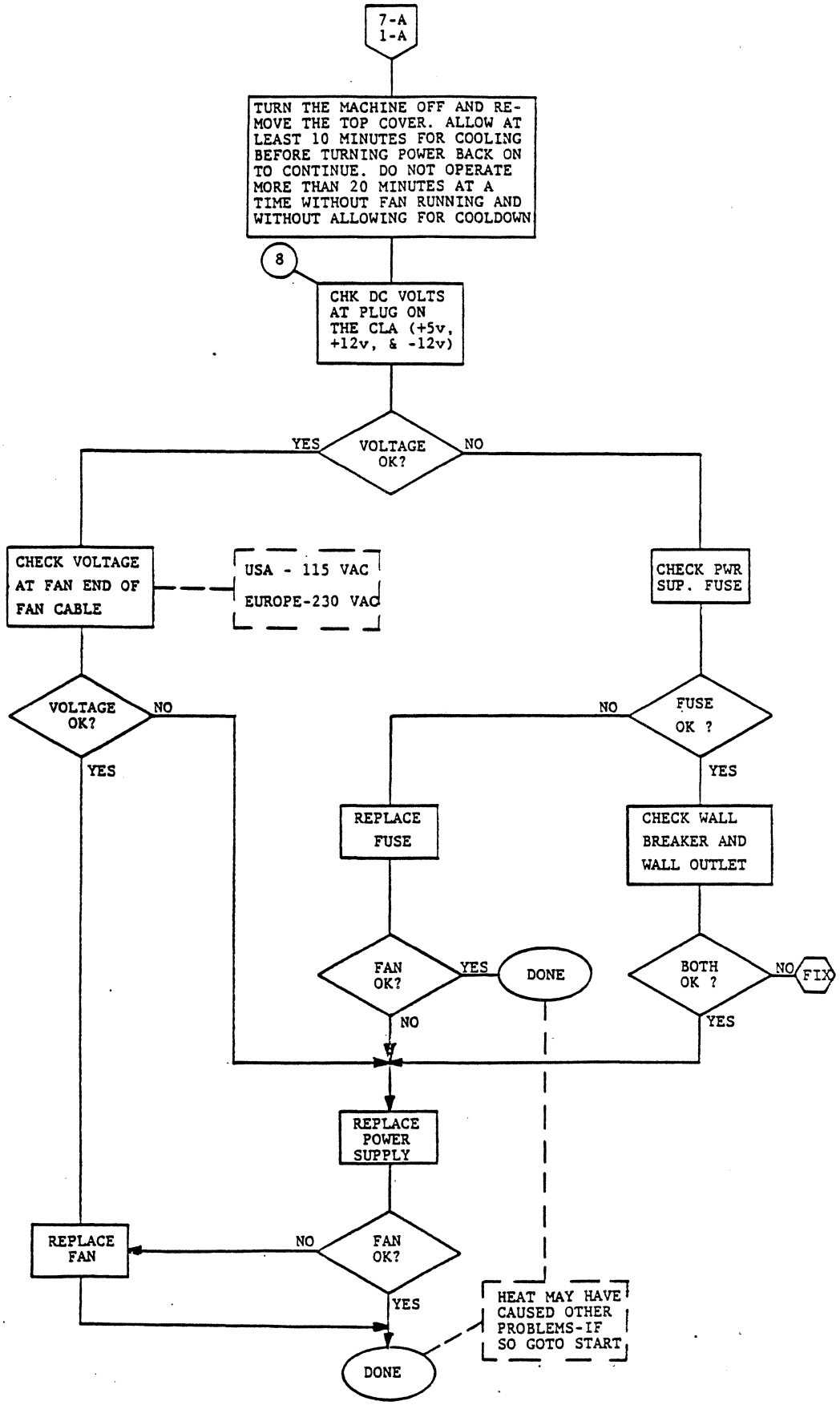

3-A
1-D
3-B
1-F
REPLACE
FLOPPY DISK
DRIVE
FIX ?
YES
DONE
NO
8-C
3-A



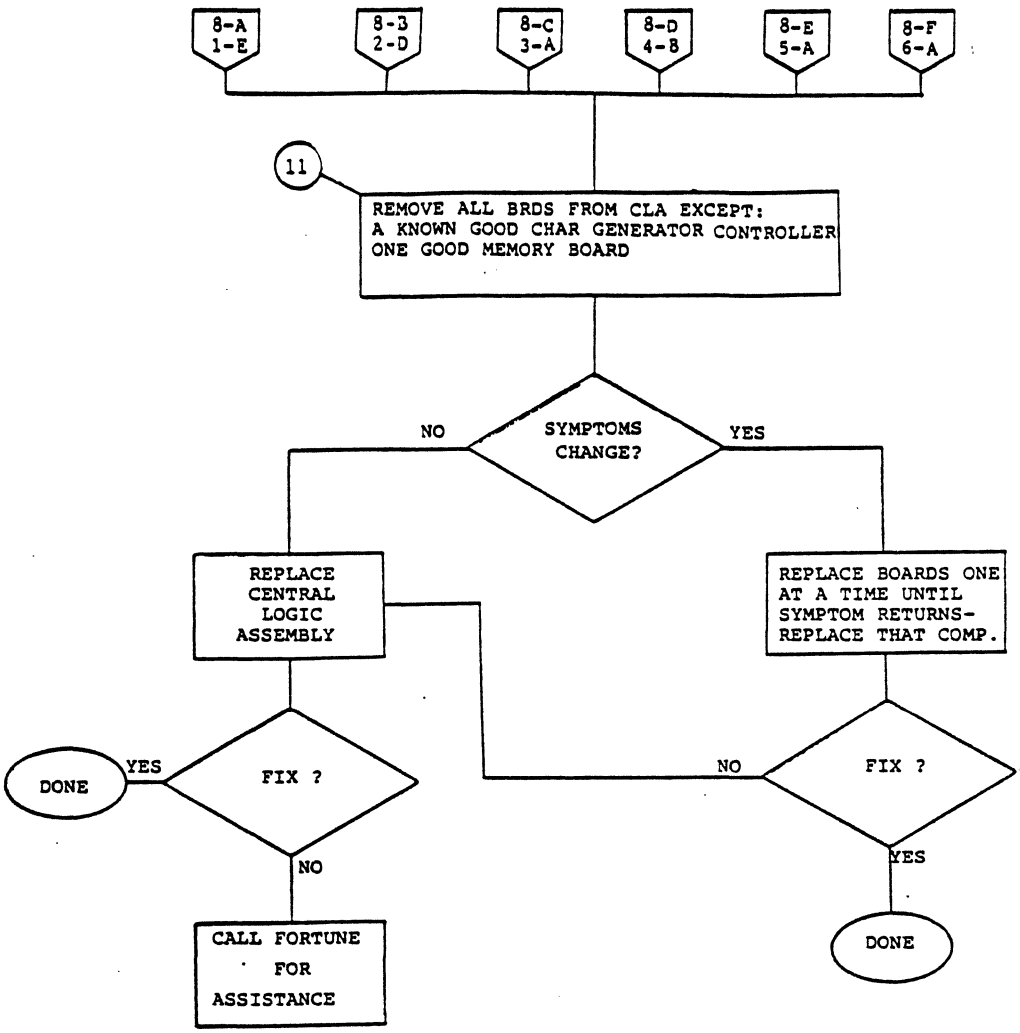
FLOWCHART - PAGE 4 - (MONITOR)


5-A
1-G
5-B
2-C
9
REPLACE
HARD DISK
CONTROLER
FIX ?
YES
DONE
NO
REPLACE
HARD DISK
CABLES
FIX ?
YES
DONE
NO
10
REPLACE
HARD DISK
DRIVE
FIX ?
YES
DONE
NO
8-E
5-A


6-A
2-B
6-B
4-A
7
REPLACE
POWER
SUPPLY
8
CHK DC VOLTS
AT PLUG C.J
THE CLA (+5v,
+12v, & -12v)
VOLTAGE
OK?
NO
8-F
6-A
YES
FIX?
NO
1-START
6-B
YES
DONE



FLOWCHART - PAGE 7 - (POWER)


8-A
1-E
8-B
2-D
8-C
3-A
8-D
4-B
8-E
5-A
8-F
6-A
11
REMOVE ALL BRDS FROM CLA EXCEPT:
A KNOWN GOOD CHAR GENERATOR CONTROLLER
ONE GOOD MEMORY BOARD
SYMPTOMS CHANGE?
NO
YES
REPLACE CENTRAL LOGIC ASSEMBLY
REPLACE BOARDS ONE AT A TIME UNTIL SYMPTOM RETURNS- REPLACE THAT COMP.
DONE
YES
FIX ?
NO
FIX ?
NO
YES
CALL FORTUNE FOR ASSISTANCE
DONE

CHAPTER 10

PARTS

This chapter illustrates units of the Fortune system that are field replacable. The figure and index numbers, part name and part number are listed for each unit.

* * * * N O T E * * * *

ALL PARTS RETURNED TO FORTUNE MUST HAVE A "CUSTOMER SERVICE REPORT" (CSR) ATTACHED. THE TOP COPY (WHITE) IS FOR YOUR RECORDS, THE OTHER THREE COPIES (YELLOW, PINK, AND HARD) MUST BE ATTACHED TO THE RETURNED PART. INSURE THAT ALL INFORMATION IS FILLED OUT ON THE DSR TO PREVENT DELAYS.
IF THE PART IS FROM A SYSTEM NOT COVERED BY WARRANTY, A PO# MUST BE PROVIDED ON THE BOTTOM OF THE CSR.
PARTS BEING RETURNED FOR UPGRADE DURING WARRANTY MUST HAVE A CSR ATTACHED.

Figure 10-1

BASIC UNITS

Figure	Index	Part Name	Part Number	Comments
10-1	1	Video Monitor Assembly	1000019-01	
10-1	2	Central Processing Unit	1000044-xx	See Fig.10-7
10-1	3	Keyboard	1000016-01	
10-1	4	Keyboard Cable	1000017-01	
10-1	5	Video Monitor Cable	1000017-01	
		Power Cable 115V	1001003-01	

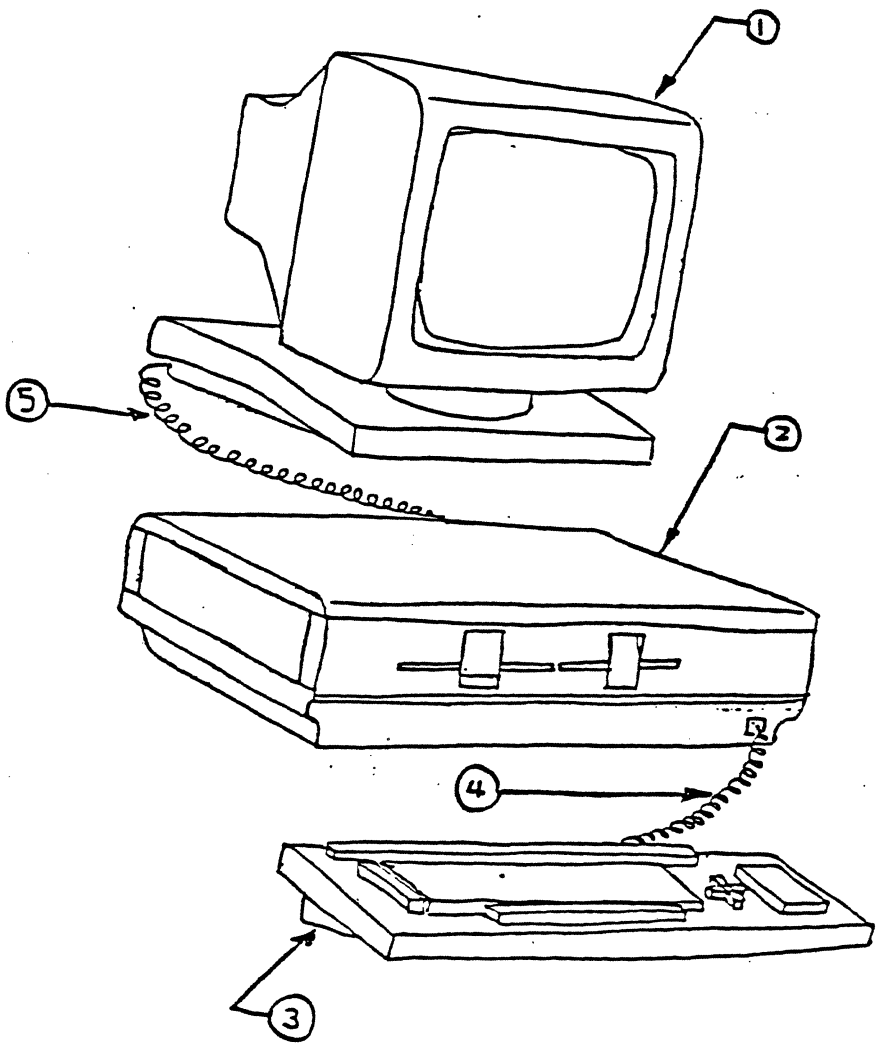


Figure 10-1

BASIC UNITS

Figure 10-2

KEYBOARD

Figure	Index	Part Name	Part Number	Comments
10-2	---	Keyboard Assemblies	1000016-01	Keyboard, English
10-2			1001195-01	Keyboard, French
10-2			1001195-02	Keyboard, German
10-2			1001195-03	Keyboard, UK
10-2			1001195-05	Keyboard, Fr/Sws
10-2			1001195-06	Keyboard, Ger/Sws
10-2			1001195-07	Keyboard, Swed/Fin
10-2			1001195-08	Keyboard, Nor/Dan
10-2			1001195-09	Keyboard, Italian
10-2			1001195-10	Keyboard, Span/Port
10-2			1001195-11	Keyboard, Can/French
10-2	1	Keyboard Electronics	1000106-01	Includes Keyboard, ribbon cable and circuit board.
10-2	2	Screw	1000118-01	3 Places
10-2	3	Screw	1000118-02	4 Places
10-2	4	Keyboard base	1000119-01	Domestic
10-2	4	Keyboard base	1001221-01	International
10-2	5	Keyboard cover	1000120-01	Domestic
10-2	5	Keyboard cover	1001222-01	International
10-2	6	Keyclick Harness	1000122-01	Adjustment knob not included
10-2	7	Rubber feet	1000129-01	4 Places
10-2	8	Keyclick Knob	1000128-01	
10-2	9	Multiplan Strip	1000422-01	
10-2	9	Word Processing Strip	1000121-01	
10-2	9	BAS Strip	1000639-01	
10-2	9	CU Strip	1001049-01	

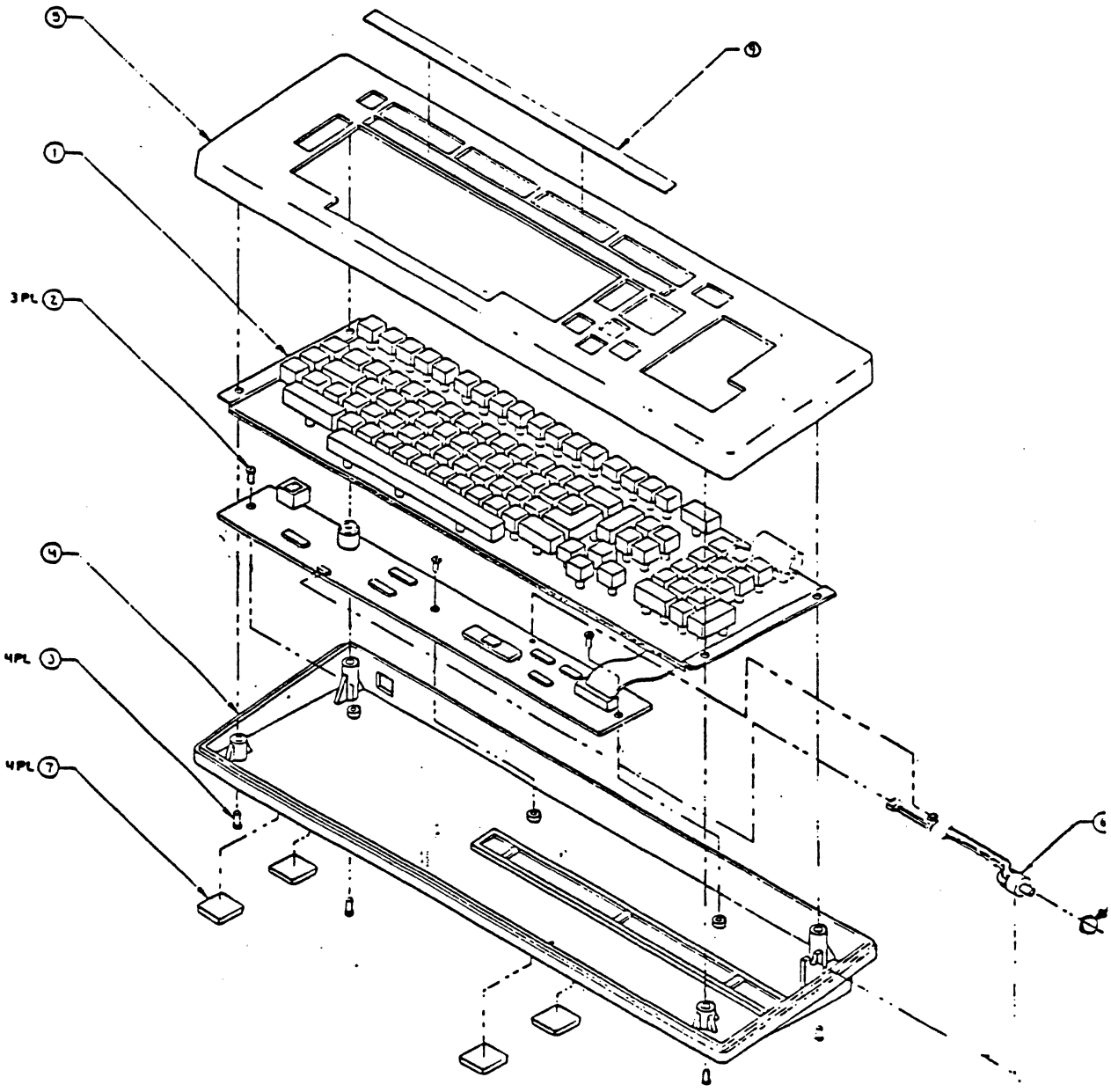


Figure 10-2

KEYBOARD

Figure 10-3

VIDEO MONITOR

Figure	Index	Part Name	Part Number	Comments
10-3	--	Video Monitor Assy	1000019-01	
10-3	1	CRT bracket	1000135-01	2 places
10-3	2	CRT electronics	1000042-01	Includes CRT, Flyback, Yoke, and Circuit card
10-3	3	Screw	1000118-05	4 places
10-3	4	CRT bezel	1000148-01	
10-3	5	Washer	1000138-01	4 places
10-3	6	Screw	1000118-01	4 places
10-3	7	Screw	1000118-01	2 places

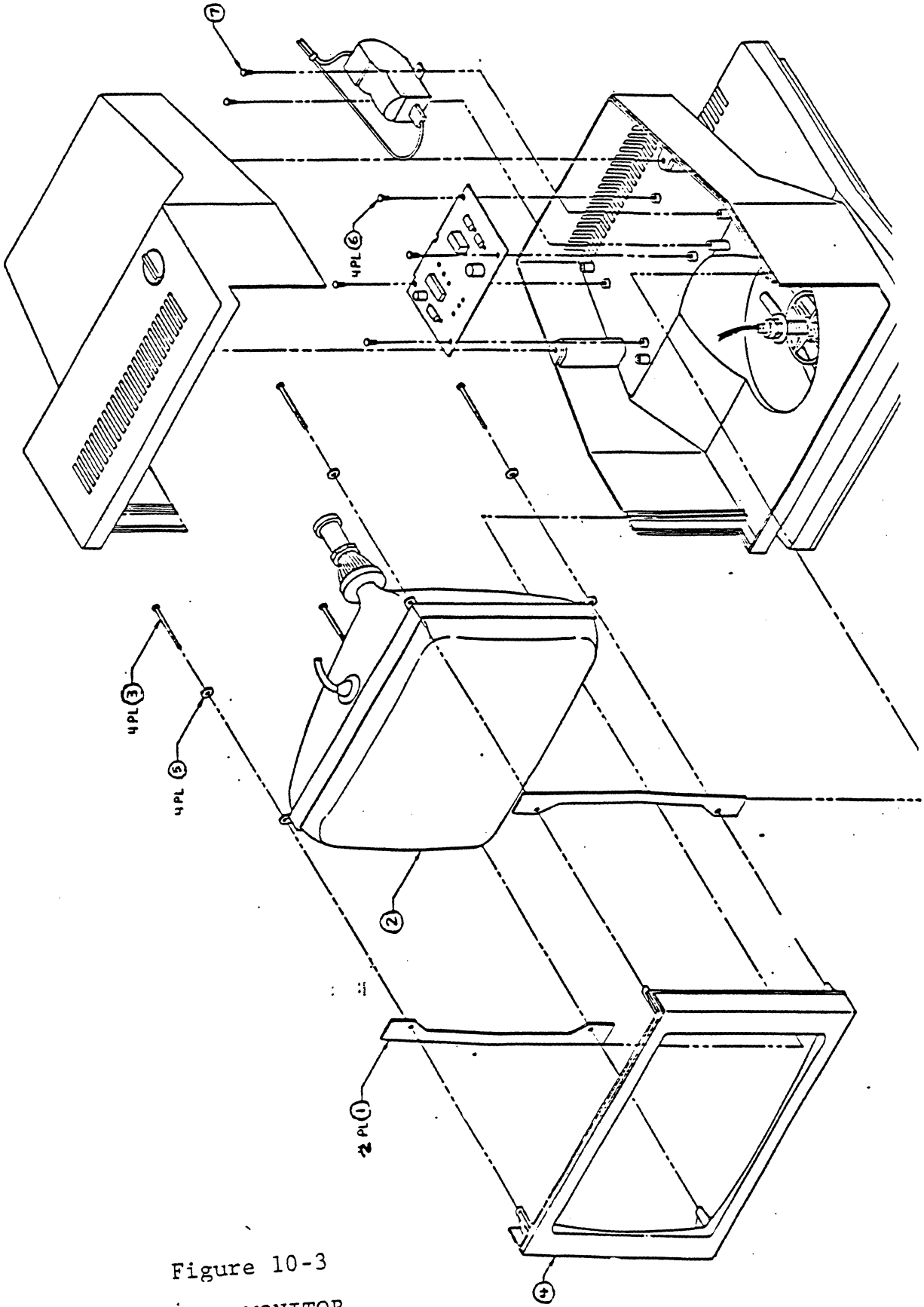


Figure 10-3

VIDEO MONITOR

Figure 10-4

UPPER SHELL

Figure	Index	Part Name	Part Number	Comments
10-4	--	Upper Shell Assy	1000133-01	
10-4	1	Upper shell	1000134-01	
10-4	2	Cable Assy	1000131-01	
10-4	3	Knob	1000136-01	
10-4	4	Clip	1000137-01	

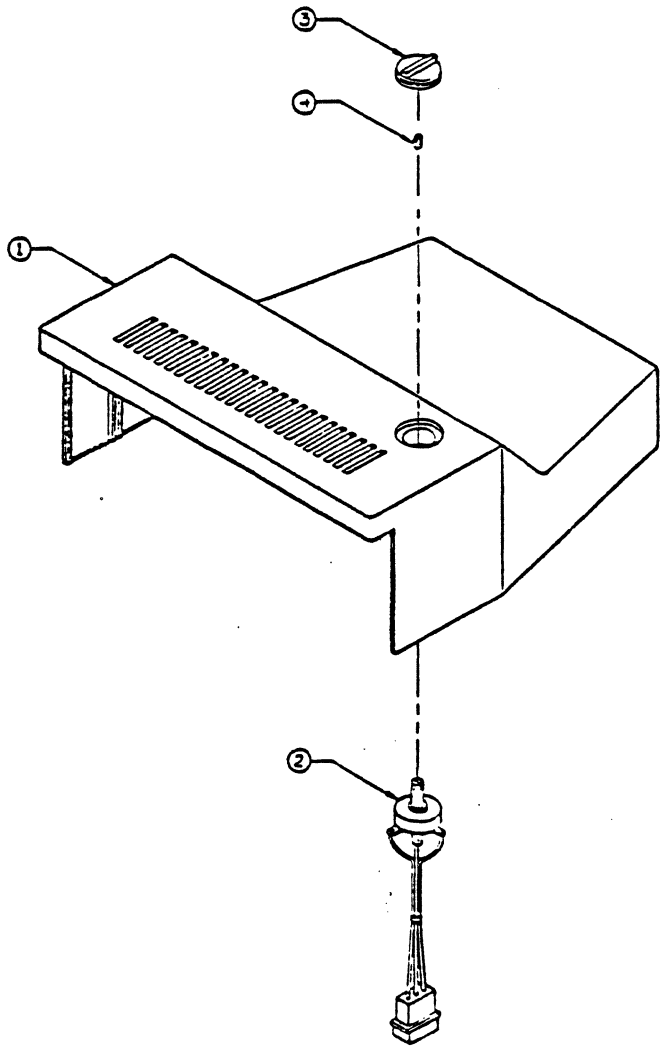


Figure 10-4

UPPER SHELL

Figure 10-5

LOWER SHELL AND UPPER PEDESTAL

Figure	Index	Part Name	Part Number	Comments
10-5	1	Wire harness	1000043-01	
10-5	2	Pedestal	1000132-01	
10-5	3	Teflon Tape	1001024-01	2 places
10-5	4	Screw	1000139-01	2 places
10-5	5	Plate	1000140-01	
10-5	6	Spring	1000141-01	
10-5	7	Nipple	1000142-01	
10-5	8	Washer	1000144-01	
10-5	9	Washer	1000601-01	
10-5	10	Lower Shell	1000149-01	
10-5	11	Teflon insert	1000602-01	3 places
10-5	12	Teflon pad	1000603-01	4 places
10-5	13	Brass nut	1000143-01	4 places
10-5	14	Terminal block	1000636-01	
10-5	15	Wiring harness	1000395-01	Includes lugs, and connector

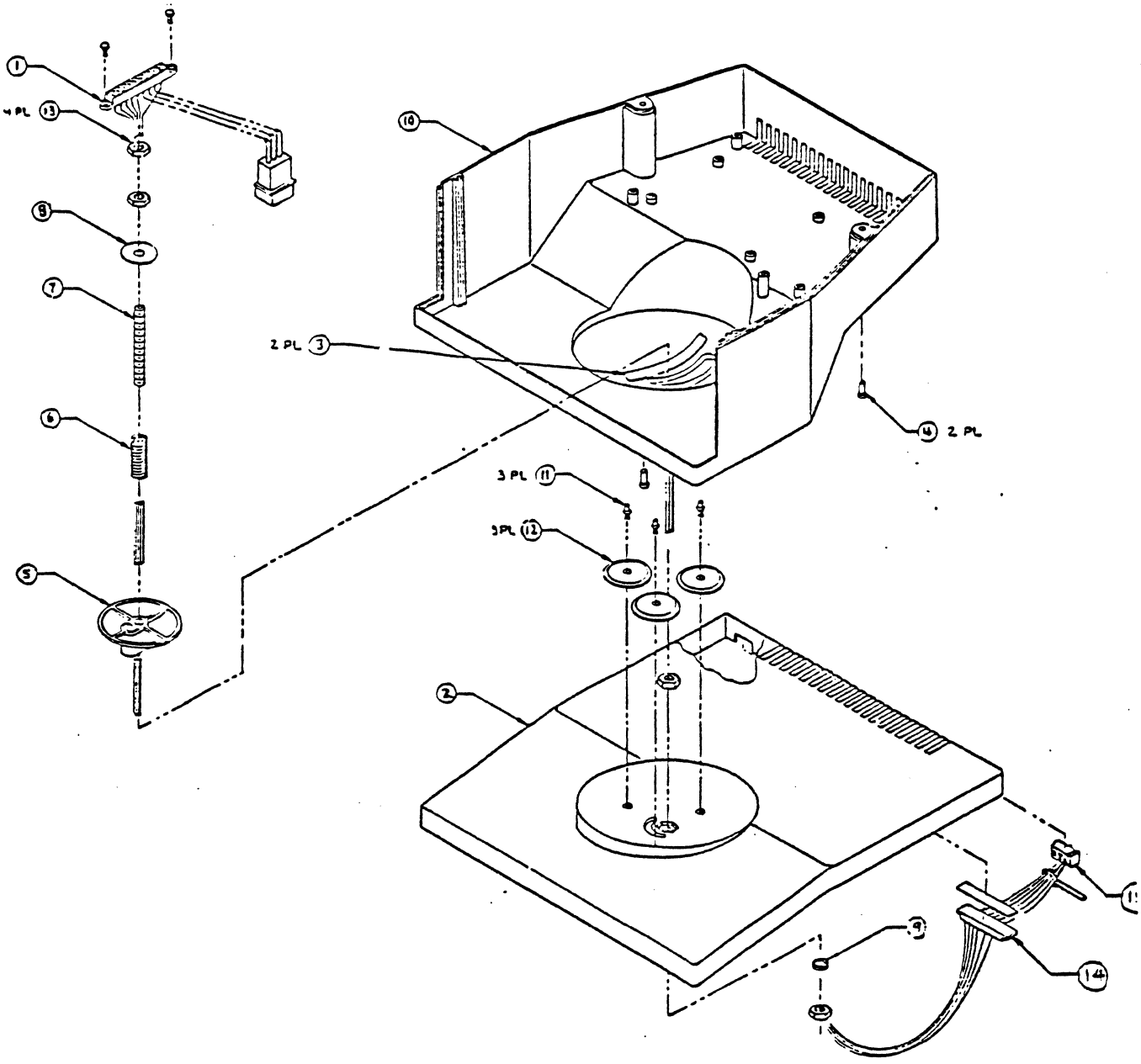


Figure 10-5

LOWER SHELL AND UPPER PEDESTAL

Figure 10-6

MONITOR BASE

Figure	Index	Part Name	Part Number	Comments
10-6	--	Monitor Base Assy	1000020-01	
10-6	1	Monitor Base	1000130-01	
10-6	2	Rubber feet	1000129-01	4 places
10-6	3	Screw	1000118-04	4 places
10-6	4	Shield	1001023-01	
10-6	5	Screw	1000118-07	4 places

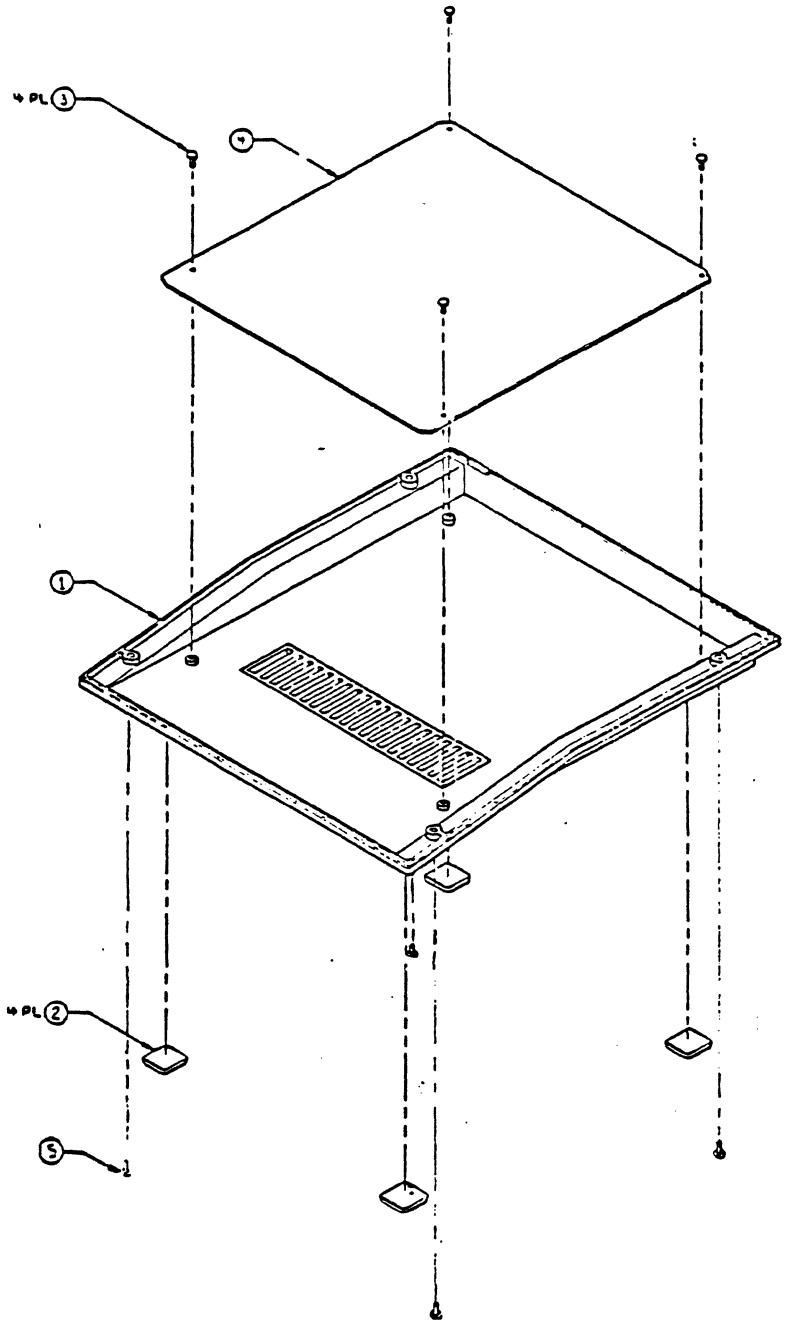


Figure 10-6

MONITOR BASE

Figure 10-7

CENTRAL PROCESSING UNIT

Figure	Index	Part Name	Part Number	Comments
10-7	--	CPU System 5	1000044-07	
10-7	--	CPU System 10	1000044-08	
10-7	1	Screw	1000327-01	6 places

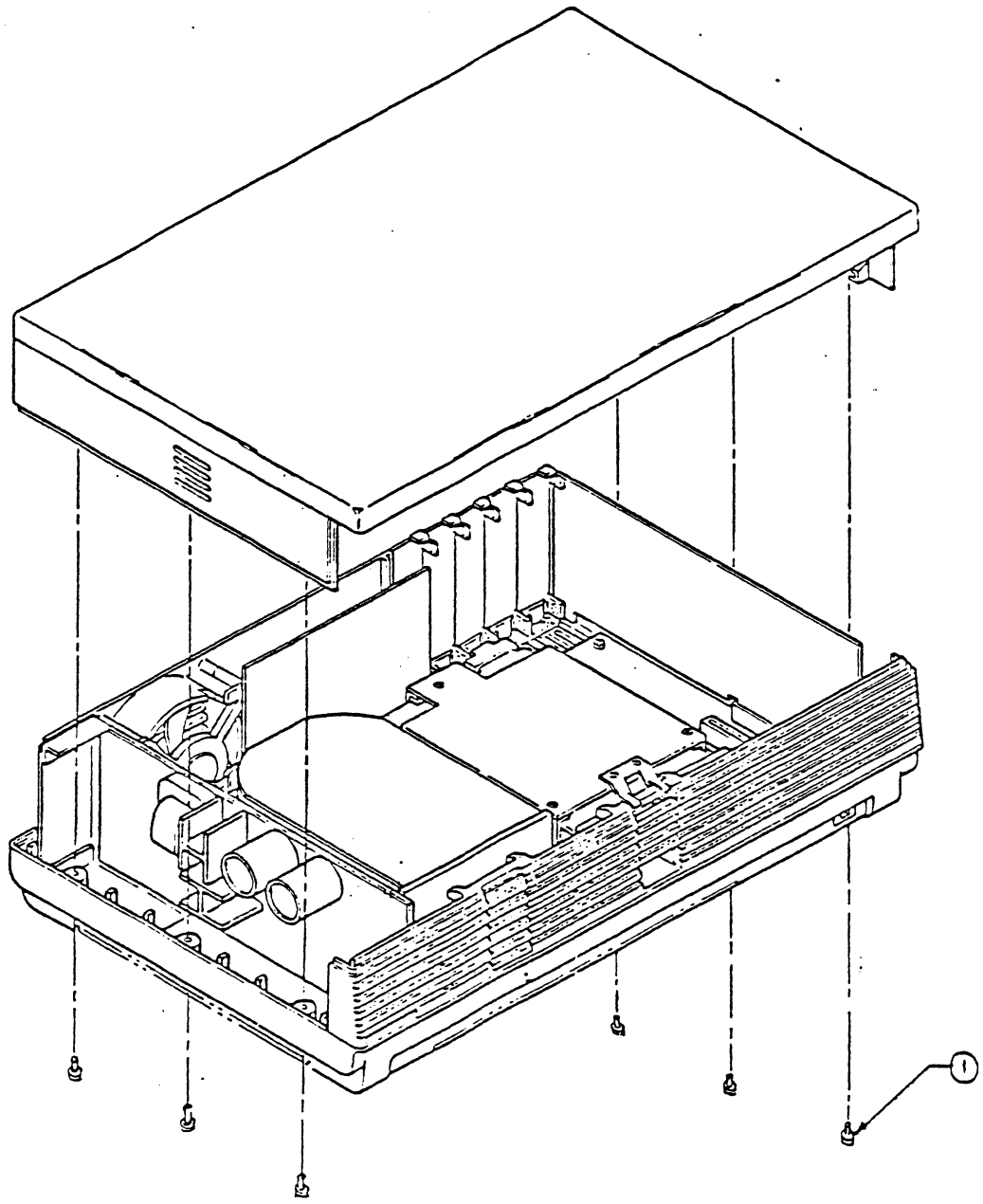


Figure 10-7

CENTRAL PROCESSING UNIT

Figure 10-8

TOP COVER ASSEMBLY

Figure	Index	Part Name	Part Number	Comments
10-8	--	Top Cover Assy	1000155-01	
10-8	1	Side Panel	1000156-01	2 places
10-8	2	Top cover	1000157-01	
10-8	3	Screw	1000118-07	6 places
10-8	4	Clip	1000325-01	6 places
10-8	5	Washer	1000326-01	6 places
10-8	6	Rubber pad	1000454-02	
10-8	7	Rubber pad	1000454-01	

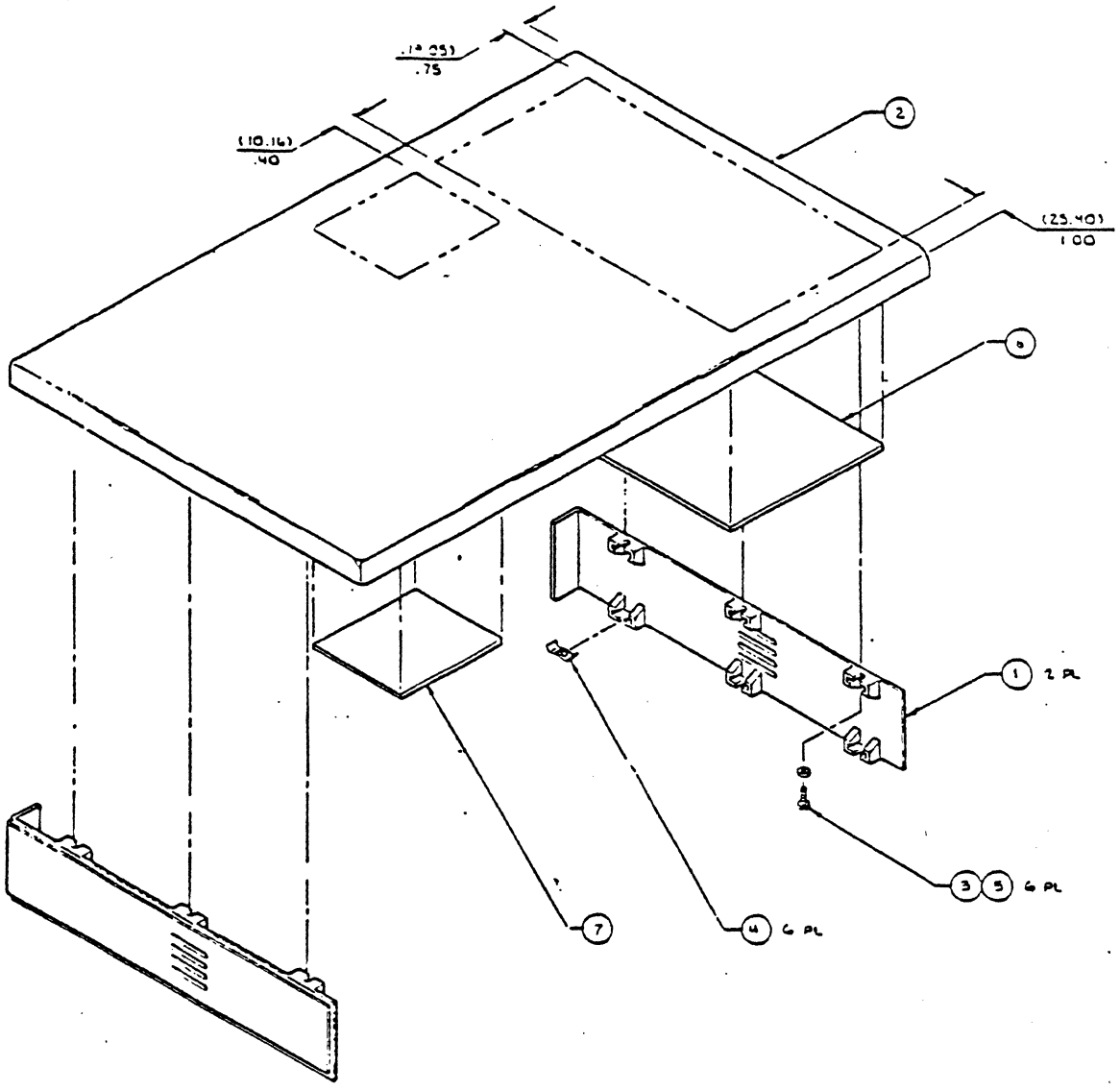


Figure 10-8

TOP COVER ASSEMBLY

Figure 10-9

FRONT PANEL

Figure	Index	Part Name	Part Number	Comments
10-9	---	Front Panel Assembly	1000151-01	
10-9	1	Front Panel	1000152-01	
10-9	1	Front Panel	1000151-02	XP System
10-9	1	Front Panel	1000151-03	PS System
10-9	2	LED Harness	1000205-01	2 Places
10-9	3	Ersatz Door	1000161-01	
10-9	4	Clip:Spring,Right	1001158-01	
10-9	5	Clip:Spring,Left	1001158-02	
10-9	6	Screw:Clip	1000373-02	2 Places
10-9	7	Door, Disk Shugart	1000645-01	

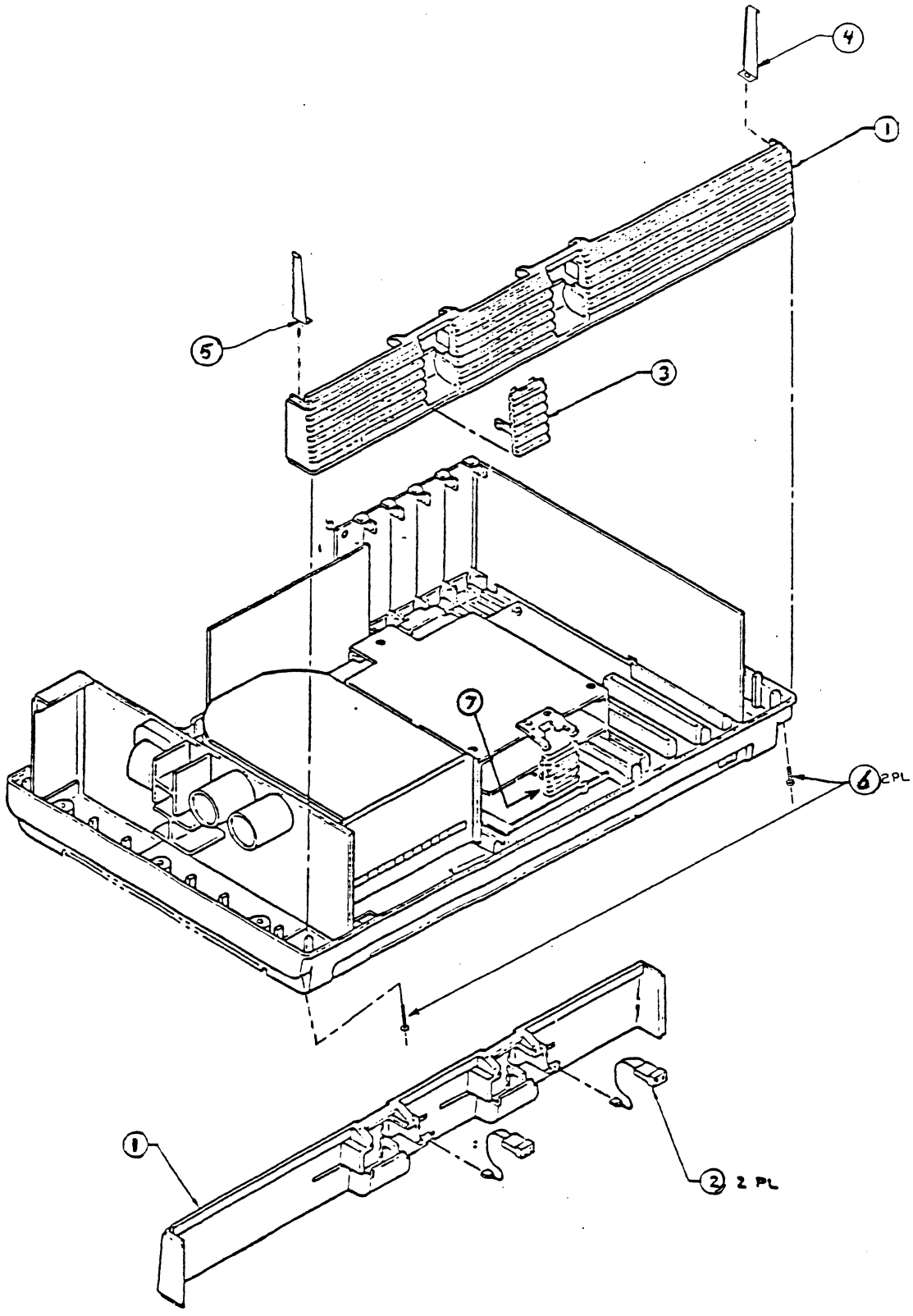


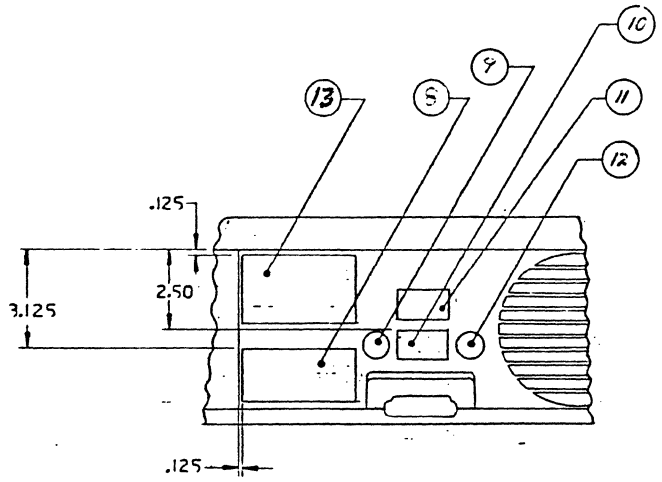
Figure 10-9

FRONT PANEL

Figure 10-10

REAR PANEL

Figure	Index	Part Name	Part Number	Comments
10-10	---	Rear Panel Assembly	1000150-01	
10-10	1	Fan 115 VAC	1000054-01	
10-10	1	Fan 230 VAC	1000054-02	
10-10	2	Screw	1000118-05	4 Places
10-10	3	Spacer	1000146-03	4 Places
10-10	4	Rear panel	1000145-01	
10-10	5	washer	1000138-01	4 Places
10-10	6	Block, Card Guide	1001160-01	
10-10	7	Lug, Ground	1000660-11	
10-10	8	Label:FCC	1001090-01	
10-10	9	Label:UL	1001162-01	
10-10	10	Label:RS232,Cable	1001126-01	
10-10	11	Label:230 Volts	1001109-01	
10-10	12	Label:CSA	1001219-01	
10-10	13	Label:ID & Serial	1001169-11	



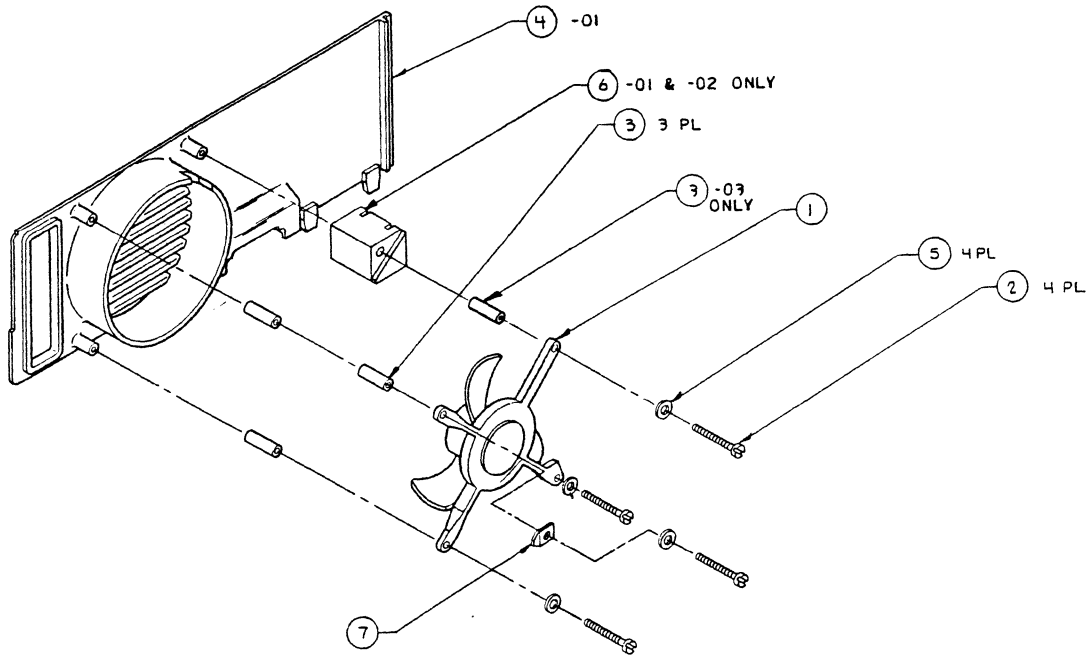


Figure 10-10

REAR PANEL

Figure 10-11

POWER SUPPLY

Figure	Index	Part Name	Part Number	Comments
10-11	1	Power Supply 115 VAC 60Hz	1000050-01	
10-11	1	Power supply 230 VAC 50Hz	1000050-02	
10-11	2	Screw	1000302-01	2 places
10-11	3	Screw	1000118-01	4 places
not shown		Power Cable	1001003-01	
not shown		Power Cable Shielded	1000499-01	

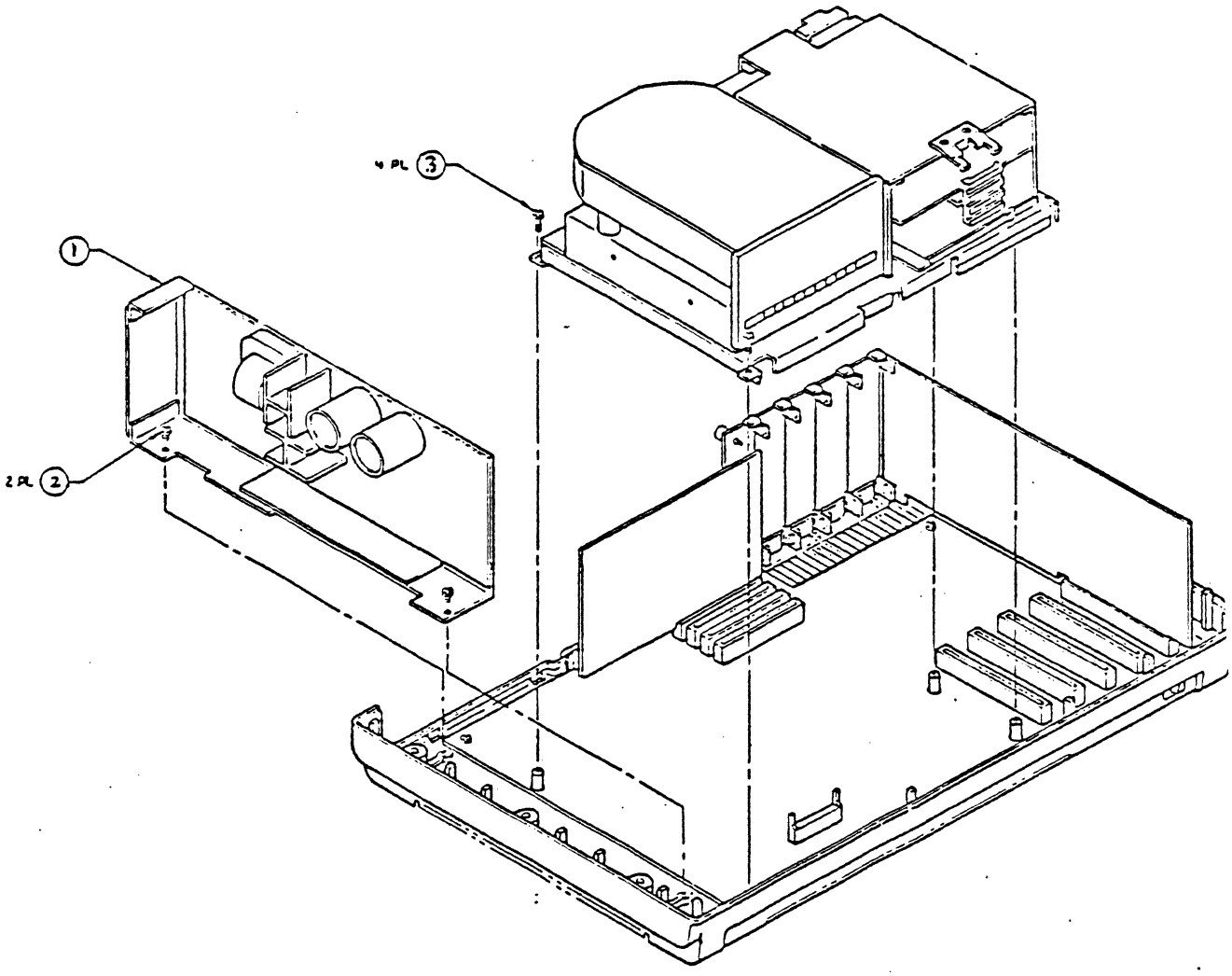


Figure 10-11

POWER SUPPLY

Figure 10-12

DISK DRIVE BRACKET

Figure	Index	Part Name	Part Number	Comments
12-12	1	Disk Bracket	1000380-01	See Figure 10-11 for screw
12-12	2	Flexible Disk	1000058-01	
10-12	3	5M hard Disk	1000081-01	
10-12	3	10M Hard Disk	1000081-02	
10-12	3	30M Hard Disk	1001980-02	Voice Coil High-Per.
10-12	3	20M Hard Disk	1000081-03	
10-12	3	20M Hard Disk	1001980-01	Voice Coil High-Per.
10-12	4	Disk Door Tandon	1000162-01	
10-12	4	Disk Door Shugart	1000645-01	
10-12	5	Screw	1000303-01	6 Places
10-12	6	Radial Cable	1000082-01	20 Wire
10-12	6	Radial Cable	1000418-01	20 Wire to Exp. Cab.
10-12	7	Serial Cable	1000083-01	34 Wire
10-12	7	Serial Cable	1000419-01	34 Wire to Exp. Cab.
10-12	8	Shield,FDU	1000448-01	
10-12	8	Shield,20Meg	1000448-02	
10-12	8A	Hard Disk Shield Ext.	1001172-01	
10-12	9	Flexible Disk Cable	1000059-01	
10-12	10	Screw	1001051-01	10 Places
10-12	11	Lock Washer	1000411-01	
10-12	12	Stand-Off 20Meg.HD	1001130-01	4 Places
10-12	13	Capacitor Assembly HD	1001612-01	
10-12	14	Clamp,Cap Assy HD	1001614-01	
10-12	15	Pad, HD Shield	1000454-03	

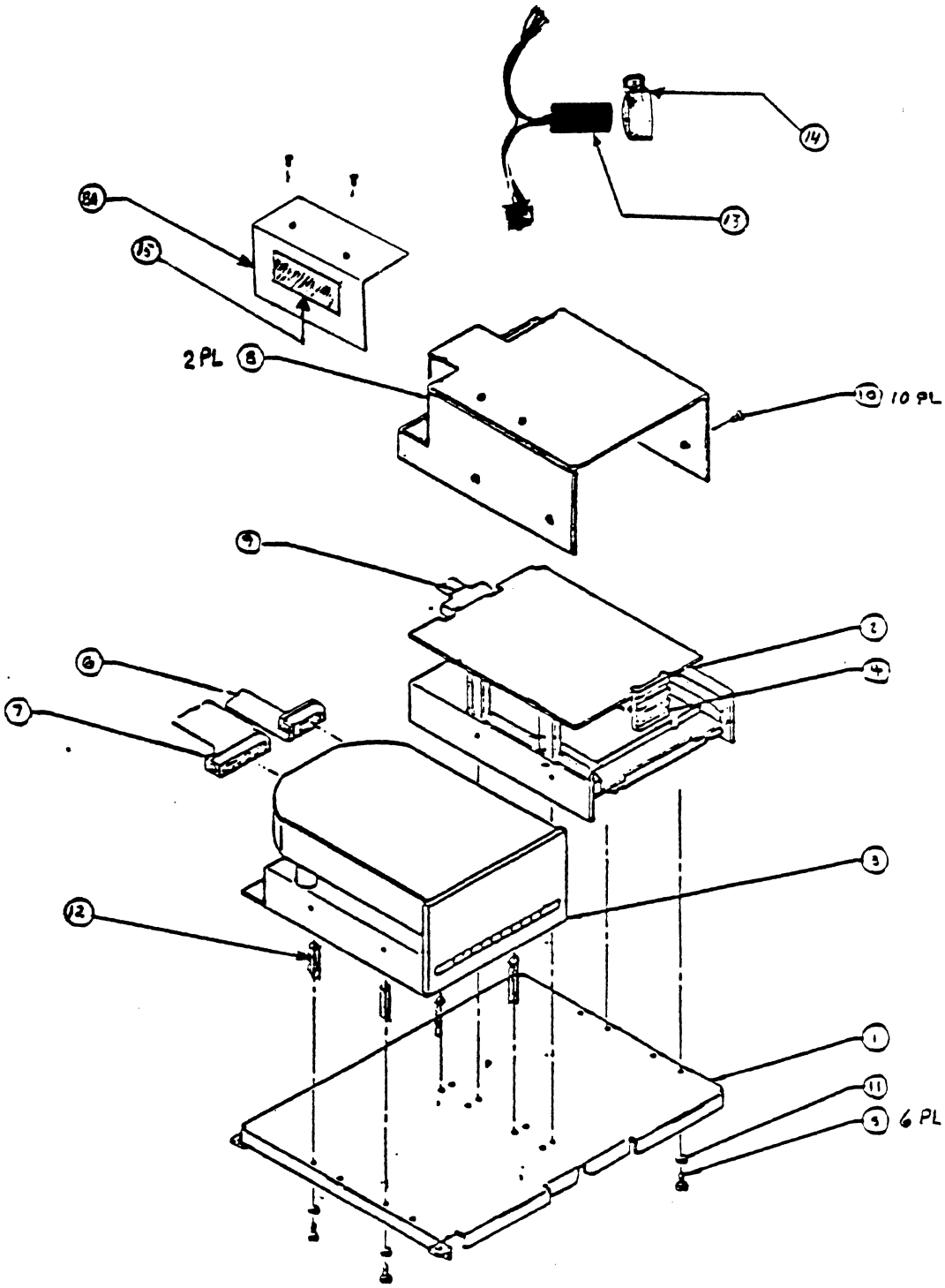


Figure 10-12

DISK DRIVE BRACKET

Figure 10-13

CIRCUIT BOARDS

Figure	Index	Part Name	Part Number	Comments
10-13	1	Screw	1000118-04	6 Places
10-13	2	Keyboard Harness	1000048-01	
10-13	3	Video Controller	1000444-01	
10-13	3	Video Controller	1000444-03	International
10-13	3	Comm B Board	1001652-01	2 Port
10-13	3	Comm A Board	1000171-01	4 Port
10-13	3	Comm A Board	1000014-01	2 Port
10-13	3	WD Disk Controller	1000079-01	
10-13	3	WD Disk Ctr. Exp Cab.	1000079-04	
10-13	3	PIO Controller	1001672-01	Tape Cartridge 2 Port
10-13	4	Motherboard (XP)	1001177-01	Old P/N 1000497-01
10-13	4	Motherboard (PS)	1001933-01	
10-13	5	128KB Memory Board	1000034-01	
10-13	5	256KB Memory Board	1000031-01	
10-13	7	Blank I/O Plate	1000165-01	
10-13	7	I/O Plate	1000165-03	Video Controller receptical opening
10-13	7	Cartridge Tape Plate	1001948-01	To Expansion Cabinet
10-13	7	I/O Plate	1000165-04	4 Port Comm A
10-13	8	Comm A Proms	1003008-01	

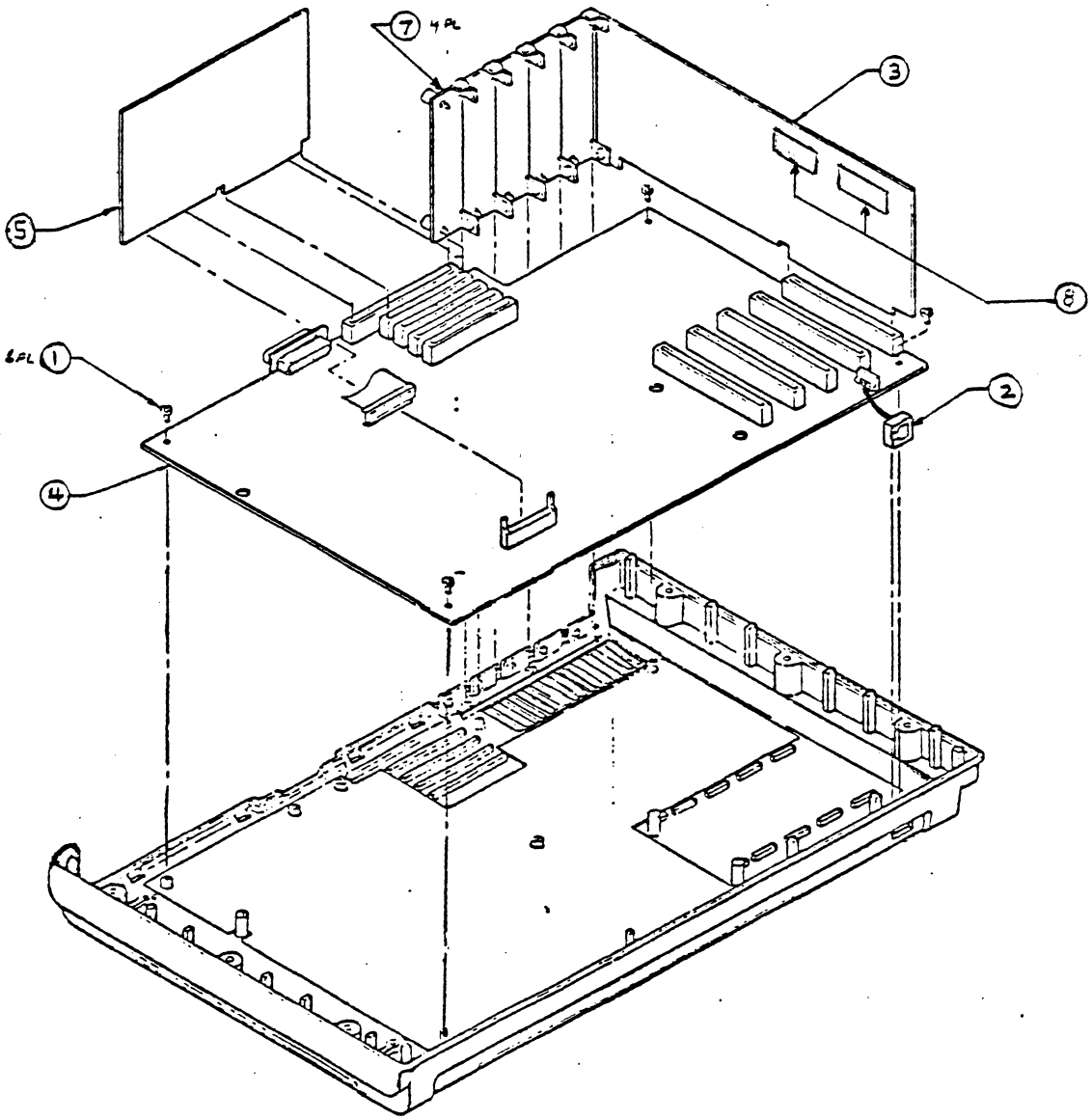


Figure 10-13

CIRCUIT BOARDS

Figure 10-14

BASE

Figure	Index	Part Name	Part Number	Comments
10-14	--	Base Assembly	1000055-01	
10-14	1	Base	1000154-01	
10-14	2	Rubber feet	1000129-01	7 places
10-14	2	Rubber ft 1/2"	1000129-02	
10-14	3	Bracket	1000164-01	
10-14	4	Screw	1000118-02	
10-14	5	Screw	1000118-04	3 places
10-14	6	Insulator	1000301-01	

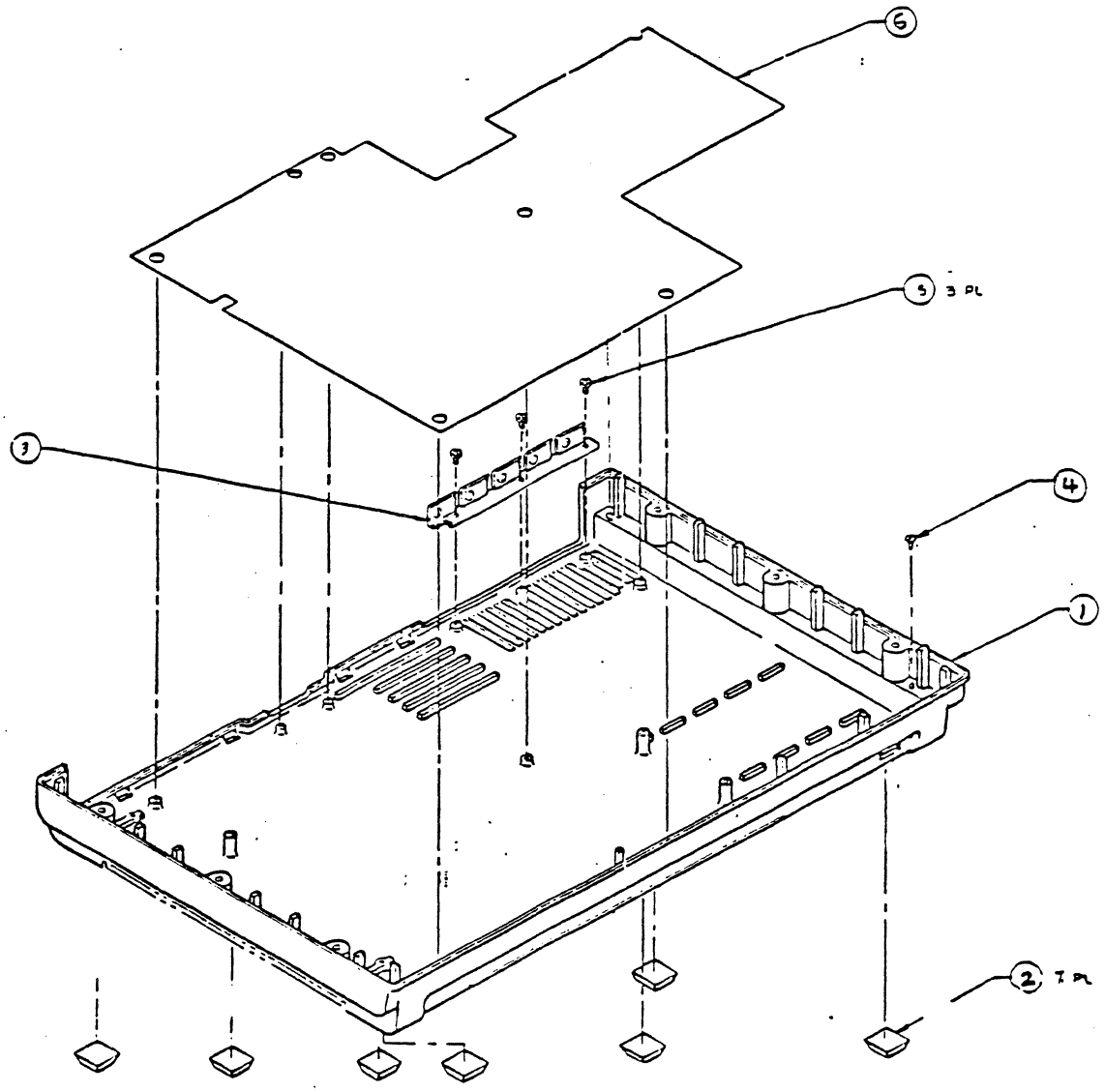


Figure 10-14

BASE

FIGURE 10-15

CRT / BEZEL ASSEMBLY

FORTUNE INTELLIGENT WORK STATION

Figure	Index	Part Name	Part Number	Comments
10-15	1	CRT Bezel	1000148-01	
10-15	2	CRT Bracket	1000135-01	
10-15	3	CRT	1000042-01	
10-15	4	Flat Washer #6	1000138-05	
10-15	5	Screw Plastite 6-19 x 1 1/2 LG	1000118-01	

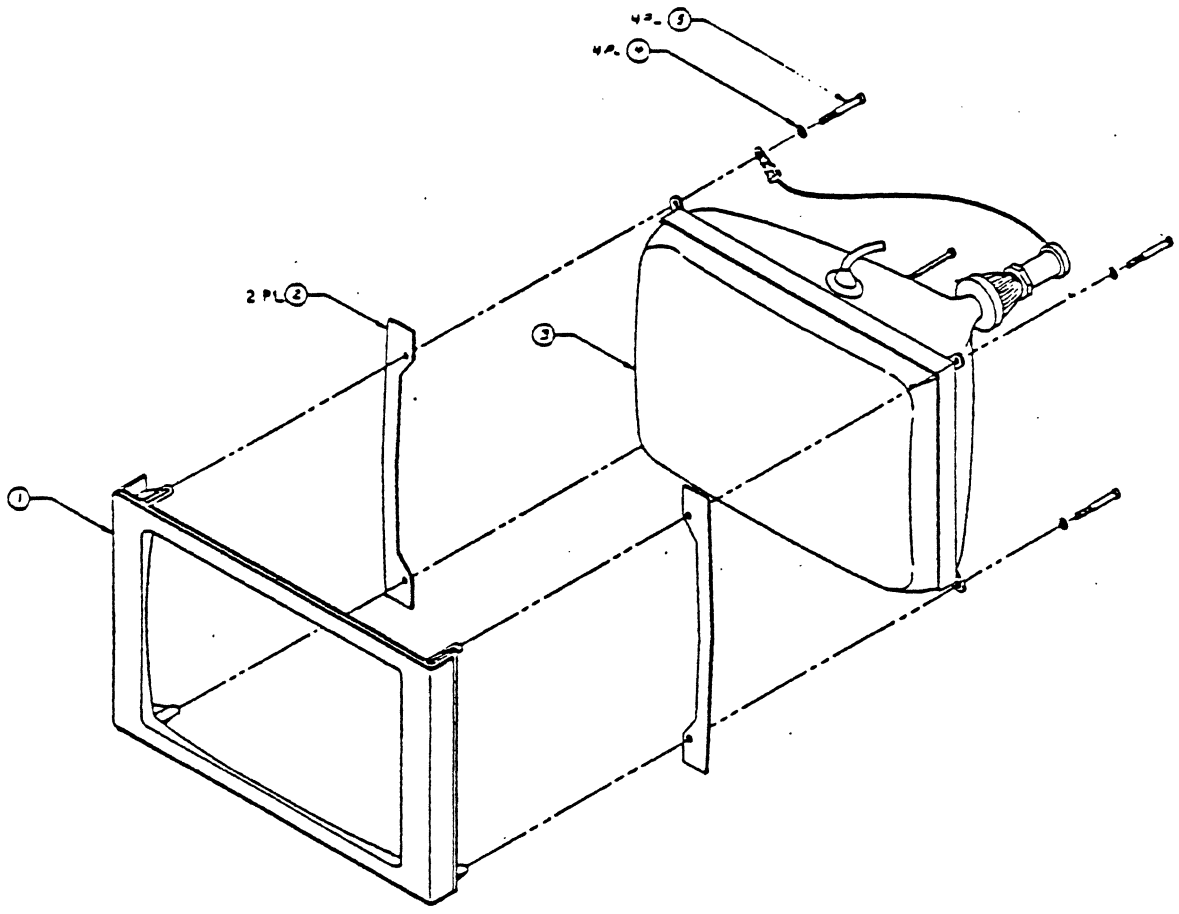


Figure 10-15

CRT / Bezel Assembly

FORTUNE INTELLIGENT WORK STATION

FIGURE 10-16

CRT UPPER SHELL ASSEMBLY

FORTUNE INTELLIGENT WORK STATION

Figure	Index	Part Name	Part Number	Comments
10-16	1	Upper Shell	1000134-02	
10-16	2	Brightness Cable	1000131-01	
10-16	3	Brightness Knob	1000136-01	
10-16	4	Knob clip	1000137-01	

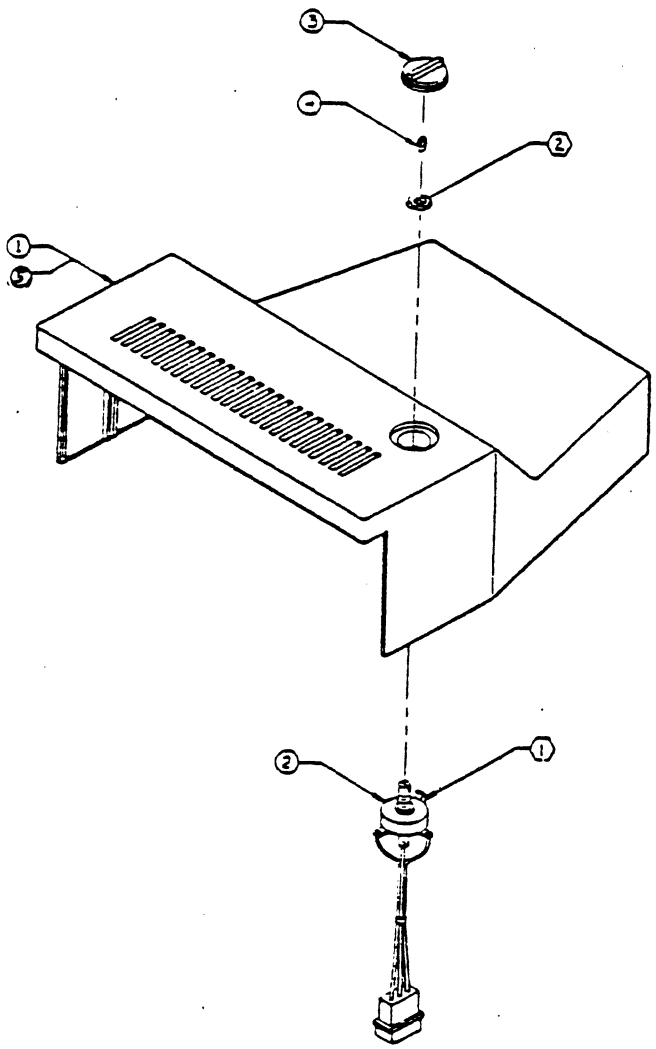


Figure 10-16

CRT Upper Shell Assembly

FORTUNE INTELLIGENT WORK STATION

FIGURE 10-17

SUB-ASSEMBLY

FORTUNE INTELLIGENT WORK STATION

Figure	Index	Part Name	Part Number	Comments
10-17	2	Wiring Assembly	1000043-01	
10-17	3	Pedestal Upper	1000132-02	
10-17	8	Ground Cable	1001113-01	
10-17	9	Captive Screw	1000139-01	
10-17	10	Load Distribution Plate	1000140-01	
10-17	11	Compression Spring	1000141-01	
10-17	12	Nipple	1000142-01	
10-17	14	Flat Washer	1000138-06	
10-17	16	Split Washer	1000667-03	
10-17	18	Lower Shell	1000149-02	
10-17	19	RFI/EMI Gasket (2.5 feet)	1001122-01	
10-17	21	Teflon Insert	1000602-01	
10-17	23	Teflon Pad	1000603-01	
10-17	24	Brass Nut	1000143-01	
10-17	25	Vent Screen	1001111-02	

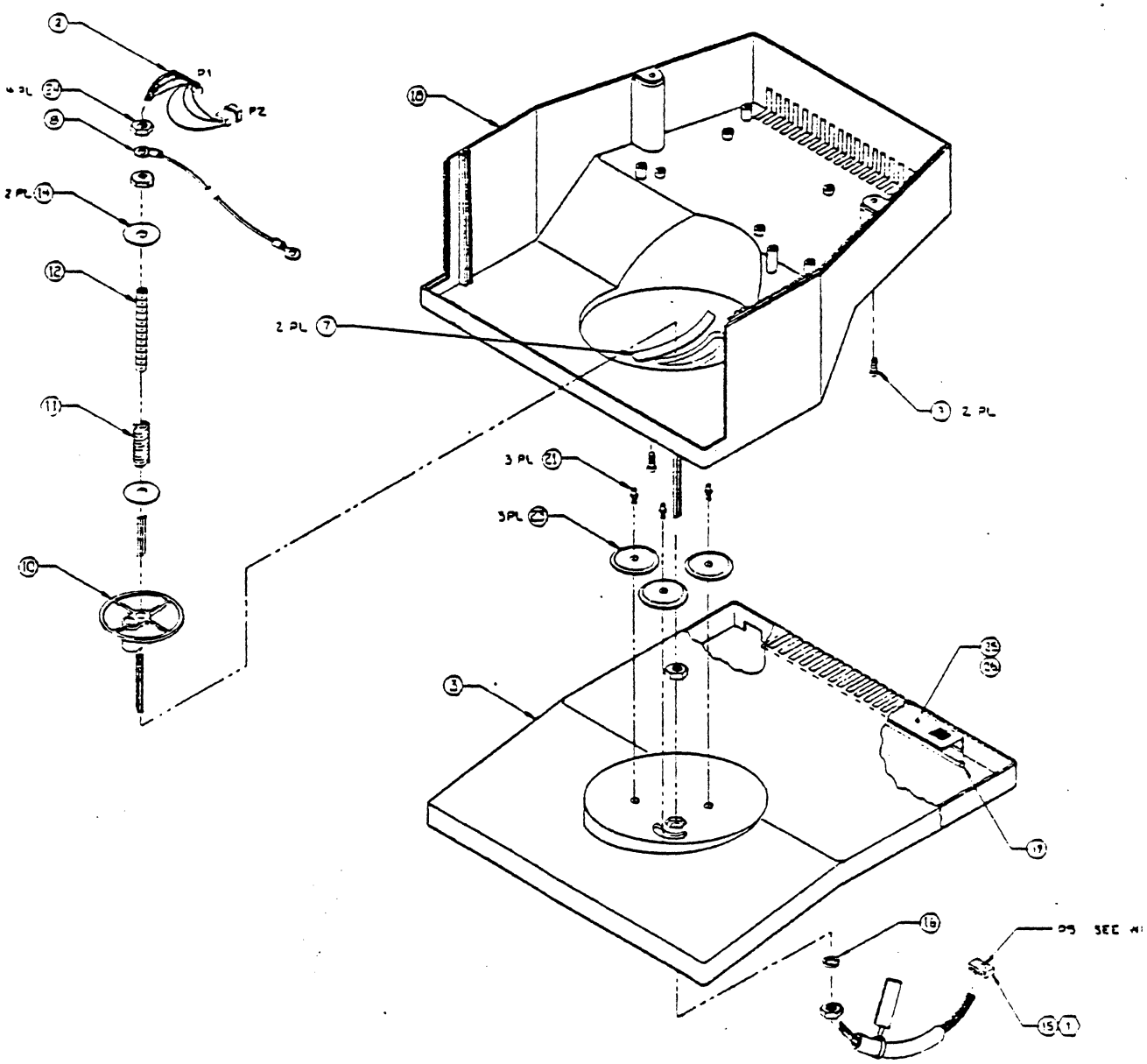


Figure 10-17

Sub-Assembly

FORTUNE INTELLIGENT WORK STATION

10

Figure 10-18

BASE SUB-ASSEMBLY

FORTUNE INTELLIGENT WORK STATION

Figure	Index	Part Name	Part Number	Comments
10-18	1	Back Panel 230 Volts	1001695-02	
10-18	2	IWS PWA	1001246-01	256 Character Set
10-18	2	IWS PWA	1001246-02	512 International Set
10-18	3	Power Supply 115 Volts	1000666-01	
10-18	4	Power Supply 230 Volts	1000666-02	
10-18	5	Back Panel 115 Volts	1001695-01	
10-18	6	Metal Base	1000447-01	
10-18	8	Keyboard Harness	1000048-01	
10-18	9	RFI/EMI Gasket (2.5ft.)	1001122-01	
10-18	10	Rubber Feet	1000129-01	
10-18	11	Screw	1000303-02	
10-18	12	Flat Washer	1000138-01	
10-18	13	Molded Base	1000611-01	
10-18	14	Screw	1000303-01	
10-18	15	Split Washer	1000411-01	
10-18	17	Screw	1000303-05	

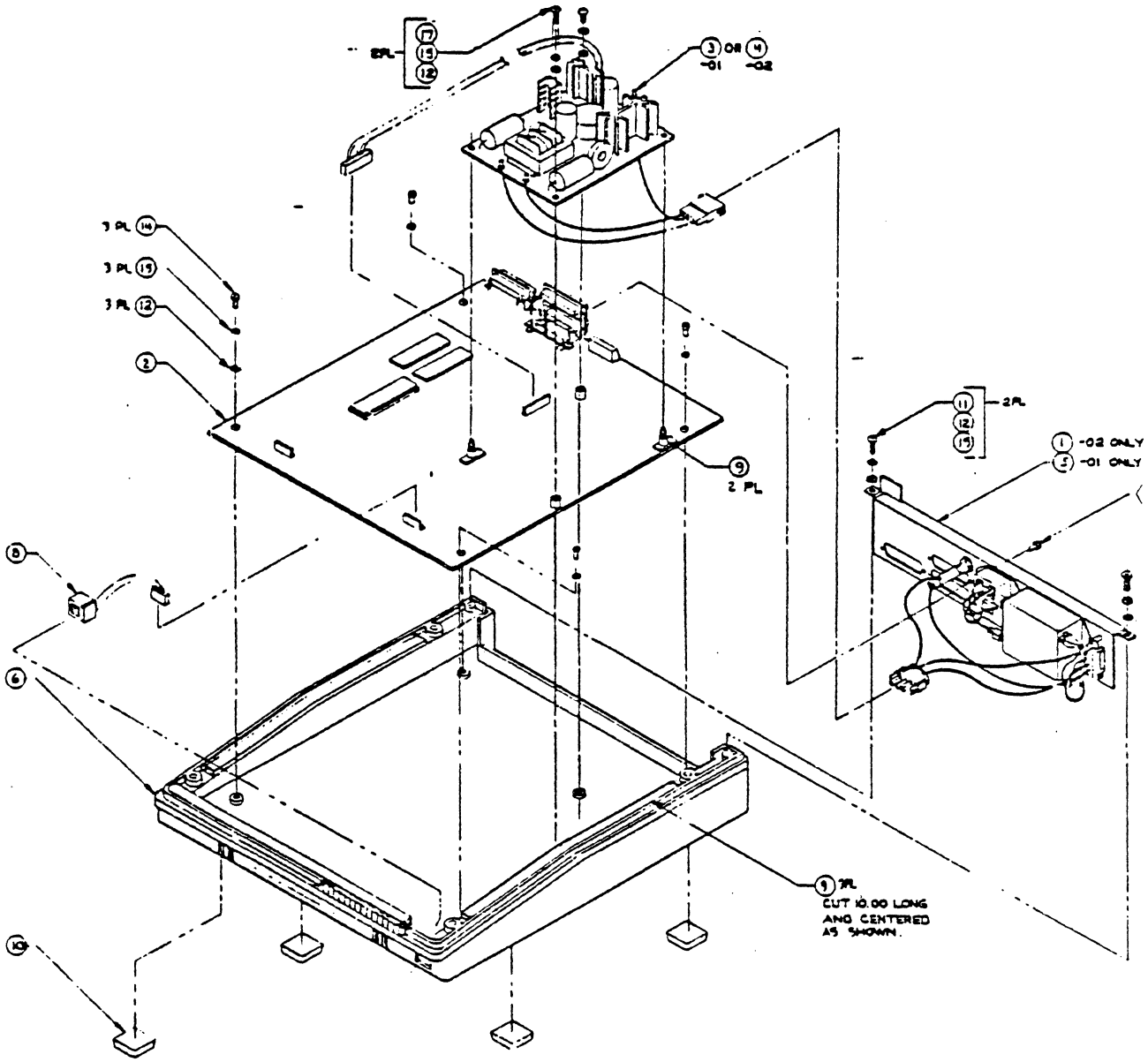


Figure 10-18

Base Sub-Assembly

FORTUNE INTELLIGENT WORK STATION

Figure 10-19

INTELLIGENT WORK STATION ASSEMBLY

Figure	Index	Part Name	Part Number	Comments
10-19	4	Screw Plastite	1000118-07	

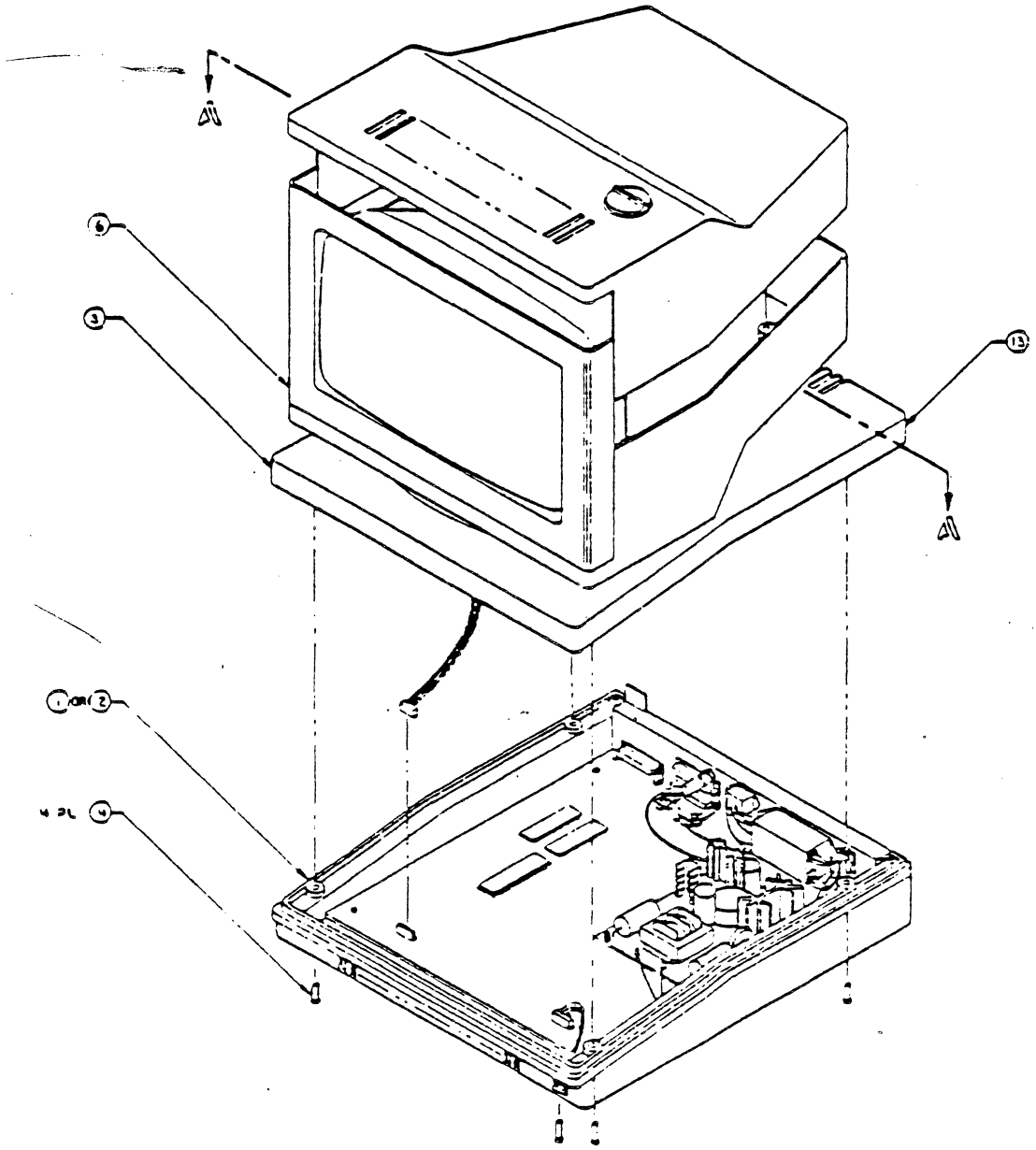


Figure 10-19

INTELLIGENT WORK STATION ASSEMBLY

Figure 10-20

EXPANSION CABINET ASSEMBLY

Figure	Index	Part Name	Part Number	Comments
10-20	1	Tape Cartridge Drive	1001755-01	
10-20	1A	Upper PWA	None	Part of Index 1
10-20	1B	Lower PWA	None	Part of Index 1
10-20	2	30Meg Hard Drive	1001980-02	Voice Coil High Perf.
10-20	3	Bracket	1001744-01	
10-20	4	Power Supply 115V	1001759-01	Expans.Cab Only
10-20	4	Power Supply 230V	1001759-02	Expans.Cab Only
10-20	5	Hard Drive I/O Panel	1001717-01	
10-20	6	Rear Panel & Fan	1000150-03	
10-20	7	Front Panel	1001770-01	Expans.Cab Only
10-20	9	Bracket/Support	1001792-01	For PWA Boards
10-20	10	I/O Panels	1000165-01	
10-20	13	Screw 6-32 x 1/4	1001283-01	
10-20	15	Screw 8-32 x 5/16	1001284-02	For Power Supply
10-20	16	Tape Drive I/O Panel	1001769-01	
10-20	27	Base Plate	1001853-01	Expans.Cab Only

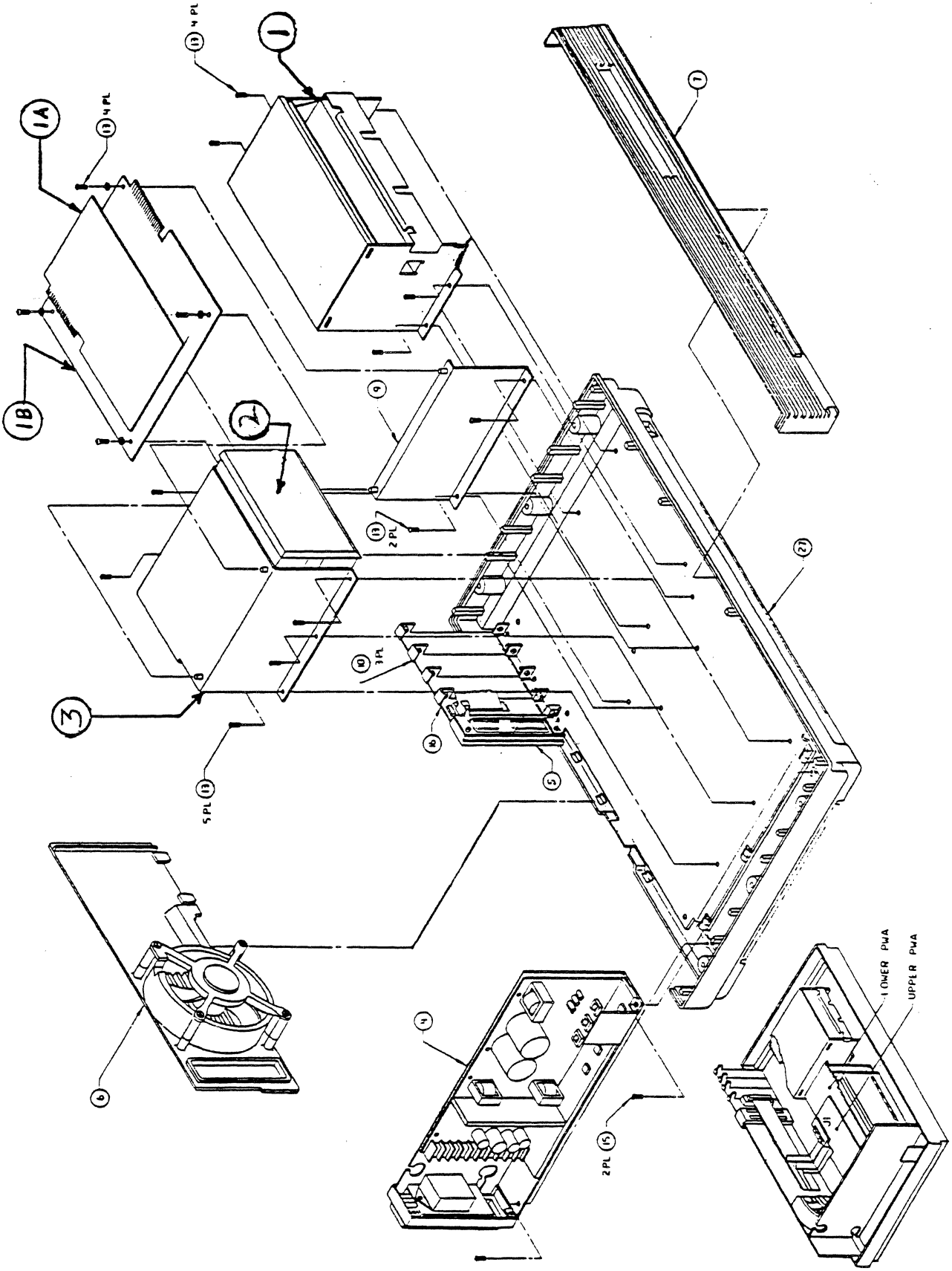


Figure 10-20

EXPANSION CABINET ASSEMBLY

Figure 10-21

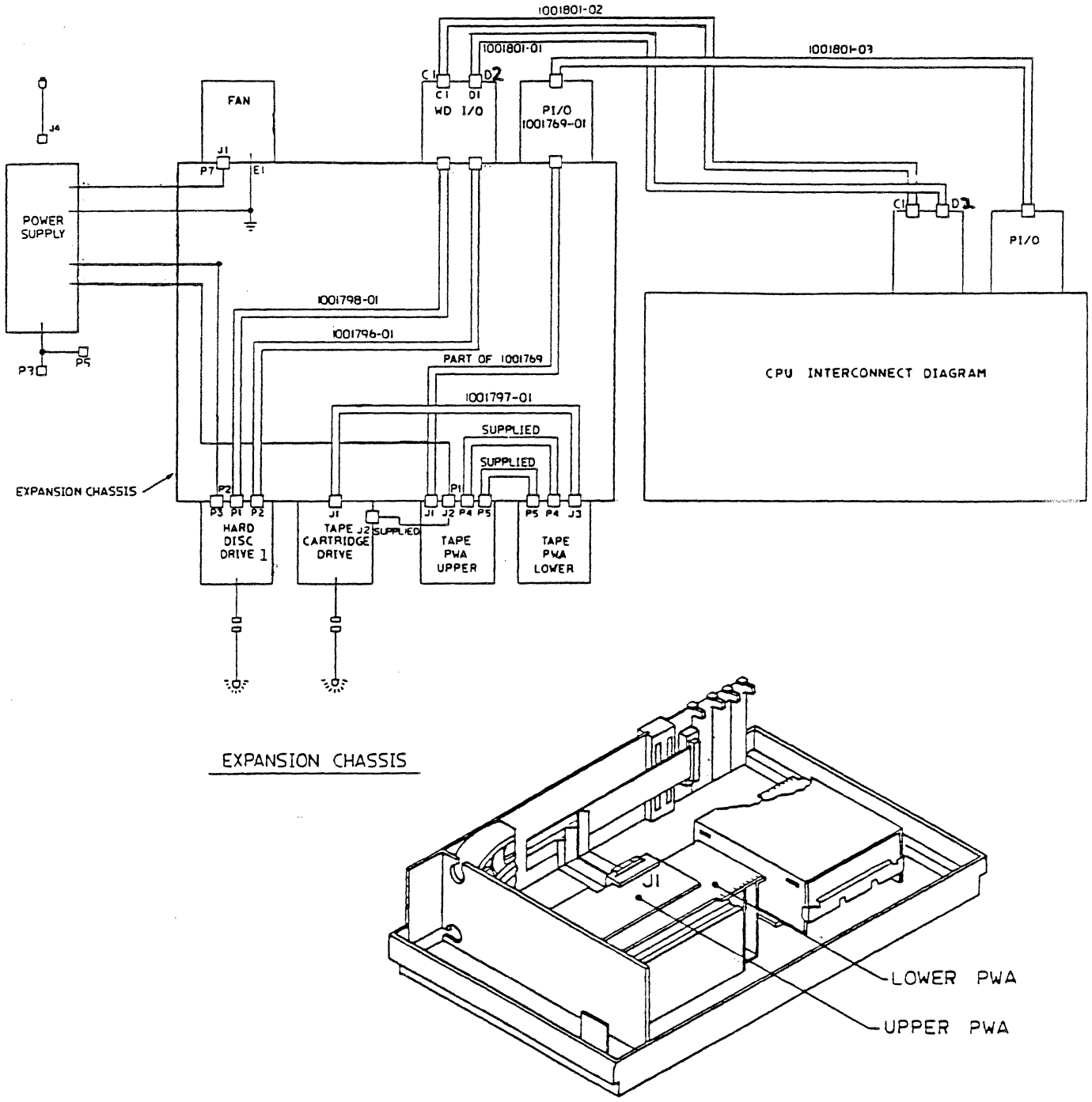
CABLE CONFIGURATION
EXPANSION CABINET:HARD DISK/CARTRIDGE TAPE

Three:External Cables

CABLE NAME	PART NUMBER
Tape Cartridge Drive I/O	1001801-03
Hard Disk Control I/O	1001801-02
Hard Disk Data I/O	1001801-01

Four:Internal Cables

CABLE NAME	PART NUMBER
Tape Cartridge Drive Interface	1001769-01
Hard Disk Data Interface	1001796-01
Hard Disk Control Interface	1001798-01
Tape Cartridge Servo/Electronics	1001797-01



EXPANSION CHASSIS

Figure 10-21

CABLE CONFIGURATION
EXPANSION CABINET: HARD DISK/CARTRIDGE TAPE

Figure 10-22

CABLE CONFIGURATION
EXPANSION CABINET:DUAL HARD DISK

Three:External Cables

CABLE NAME	PART NUMBER
Hard Disk Control I/O	1001801-02
Hard Disk Data #1 I/O	1001801-01
Hard Disk Data #2 I/O	1001801-01

Three:Internal Cables

CABLE NAME	PART NUMBER
Dual Hard Disk Control Interface	1001992-01
Hard Disk Data #1 Interface	1001796-01
Hard Disk Data #2 Interface	1001991-01

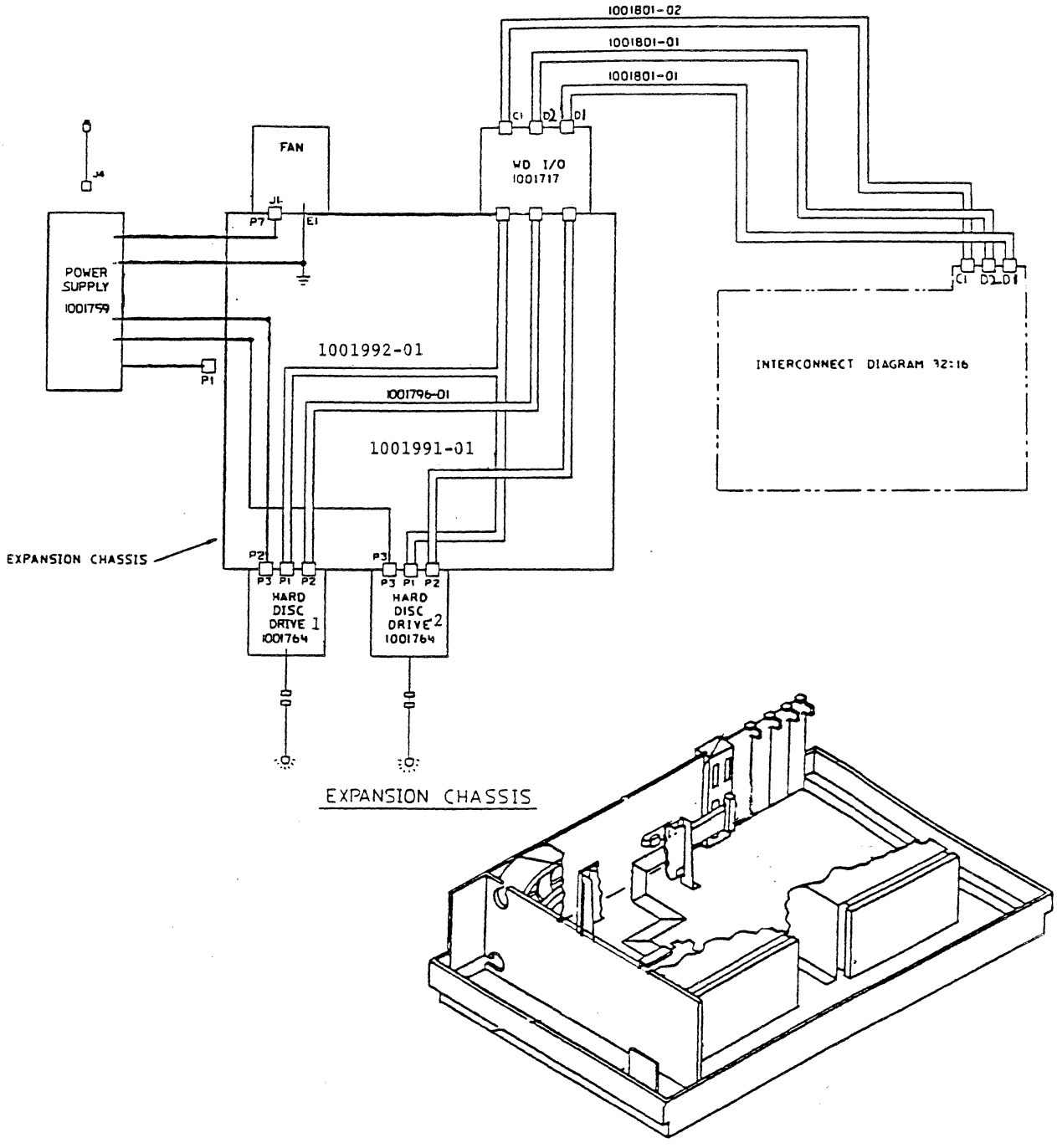


Figure 10-22

CABLE CONFIGURATION
EXPANSION CABINET: DUAL HARD DISK

Figure 10-23

CABLE CONFIGURATION
EXPANSION CABINET:SINGLE HARD DISK

Two:External Cables

CABLE NAME	PART NUMBER
Hard Disk Control I/O	1001801-02
Hard Disk Data I/O	1001801-01

Two:Internal Cables

CABLE NAME	PART NUMBER
Hard Disk Data Interface	1001796-01
Hard Disk Control Interface	1001798-01

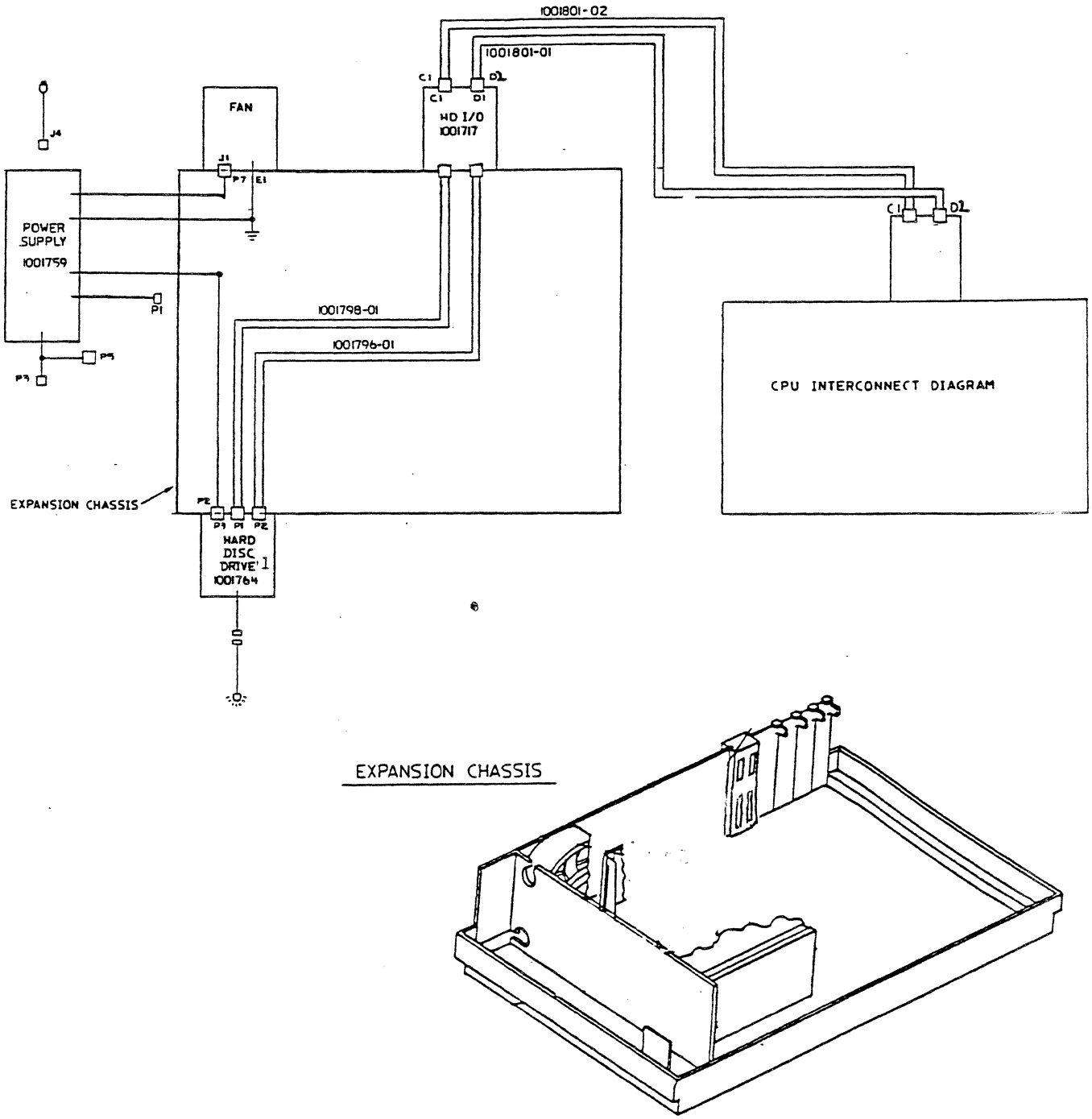


Figure 10-23

CABLE CONFIGURATION
EXPANSION CABINET: SINGLE HARD DISK

Figure 10-24

CABLE CONFIGURATION
EXPANSION CABINET:SINGLE TAPE CARTRIDGE

One:External Cables

CABLE NAME	PART NUMBER
Tape Cartridge Drive I/O	1001801-03

Two:Internal Cables

CABLE NAME	PART NUMBER
Tape Cartridge Drive Interface	1001769-01
Tape Cartridge Servo/Electronics	1001797-01

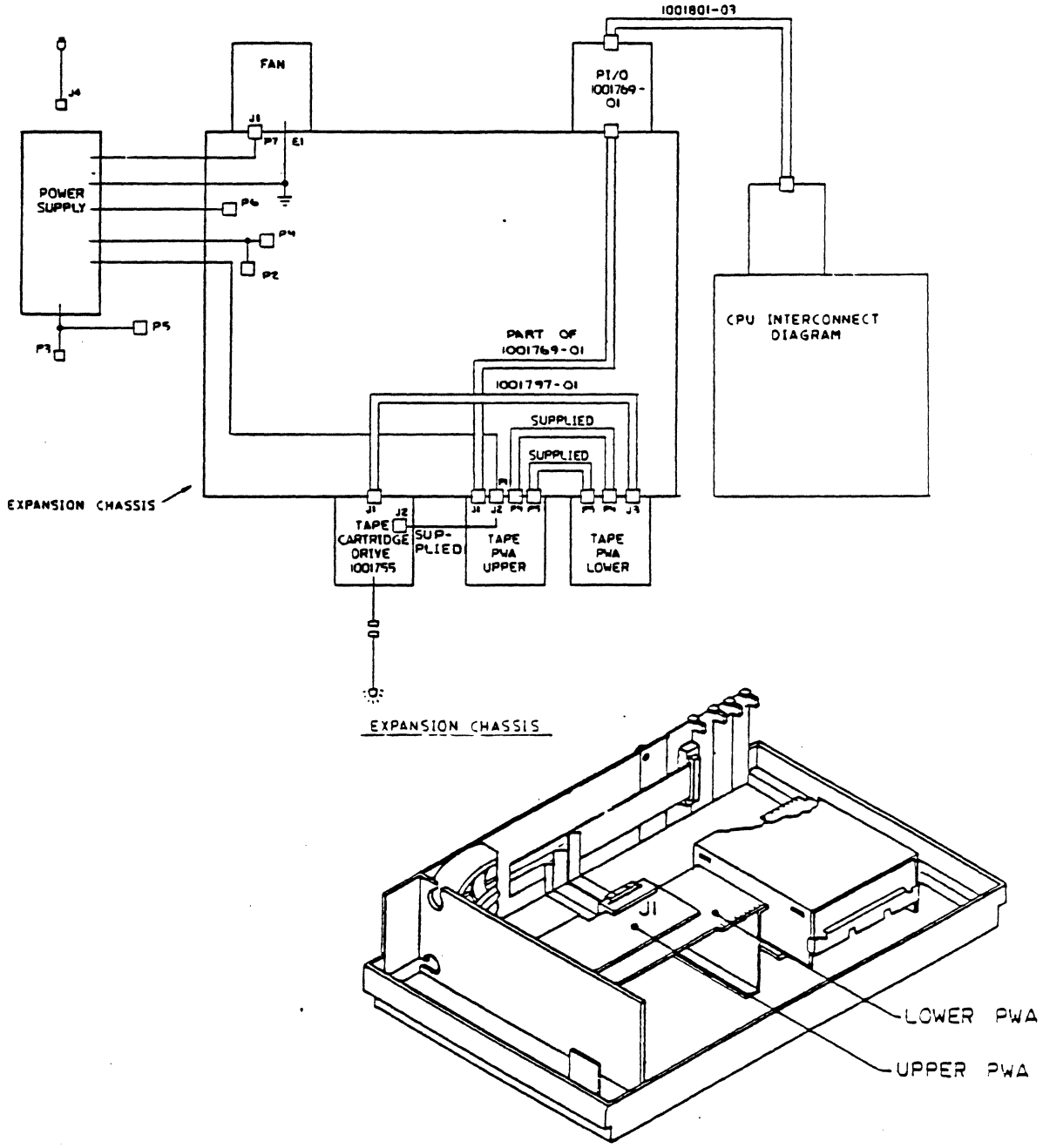


Figure 10-24

CABLE CONFIGURATION
EXPANSION CABINET: SINGLE TAPE CARTRIDGE

SPARE PARTS LIST

Part #	Part Name	System 1	2	5	10	20	30	Optnl. Spares	Depot Level	As Req	Suggest Ret. Price	
1000014-02	CommA 2 Port(1.5Proms)							X			595.00	
1000014-03	CommB 2 Port(1.7Proms)											
1000016-01	Key Bd Assy									X	510.00	
1000017-01	Cab Asm KBD/CRT	X	X	X	X	X			1/20		11.00	
1000017-02	Cab Kybd 10'							X		X	15.00	
1000019-01	Monitor Assy									X	740.00	
1000031-01	Mem 256K Wo Ecc	X	X	X	X	X			1/20		1495.00	
1000034-01	Mem 128K PWA	X	X	X	X	X			1/20		750.00	
1000042-01	Video Monitor	X	X	X	X	X			1/20		240.00	
1000043-01	Analog Harness									X	10.50	
1000048-02	Keyboard Harness										21.00	
1000050-03	Power Sup 115V	X	X	X	X	X			1/20		420.00	
1000050-04	Power Sup 230V							X	1/20		420.00	
1000054-01	Fan ASM 115V	X	X	X	X	X			1/20		30.00	
1000054-02	Fan ASM 230V							X	1/20		30.00	
1000055-01	Base Assy										140.00	
1000058-01	Flex disk 800KB	X	X	X	X	X			1/15		805.00	
1000059-01	Cab Flex Disk									X	40.00	
1000079-01	WD Disk Ctr PWA			X	X	X			1/20		1200.00	
1000079-04	WD Disk for Exp.Cab.			X	X	X			1/20		1200.00	
1000081-01	5MB Hard Disk			X					1/15		2000.00	
1000081-02	10MB Hard Disk				X				1/15		2500.00	
1000081-03	20MB Hard Disk					X					3000.00	
1000082-01	Cable ASM HD 20									X	15.00	
1000083-01	Cable ASM HD 34									X	17.00	
1000106-01	Keyboard	X	X	X	X	X			1/15		375.00	
1000118-01	Screw:PLAS 6-19X1/2"									X*		
1000118-02	Screw:PLAS 6-19X1/4"									X*		
1000118-04	Screw:PLAS 6-19X3/8"									X*		* 10ea 2.80
1000118-05	Screw:PLAS 6-19X1 1/2"									X*		
1000118-07	Screw:PLAS 6-19X5/8"									X*		
1000119-01	Keyboard Base									X	45.00	
1000120-01	Keyboard Cover									X	30.00	
1000122-01	KB Harness									X	22.00	
1000128-01	Knob Clicker									X	.70	
1000129-01	Feet Rubber									X	10/ 1.50	
1000129-02	Feet Rubber 1/2"									X	.25	

*To determine where each part is used refer to illustrated parts breakdown of Field Service Manual.

Part #	Part Name	System 1	2	5	10	20	30	Optnl. Spares	Depot Level	As Req	Suggest Ret. Price
1000130-01	Pedestal, Lower ,Crt									X	32.00
1000131-01	Video Brit Cable									X	15.00
1000132-01	Pedestal, Upper, Crt									X	35.00
1000132-02	Pedestal, Upper, FIS									X	45.00
1000134-01	CRT Upper									X	42.00
1000134-02	CRT Upper FIS									X	56.00
1000135-01	CRT Bracket									X	2.50
1000136-01	Knob Bright									X	3.50
1000137-01	Clip Knob									X	10/1.00
1000138-01	Washer									X	10/ .50
1000139-01	Screw:Captive 6-32x5/8"									X	10/ .50
1000140-01	Load Dist Plate									X*	
1000141-01	Spring Comp									X*	*KIT 3.00
1000142-01	Nipple									X*	
1000143-01	Locknut									X*	
1000144-01	Washer Steel									X	10/ .35
1000145-01	Panel Rear CPU									X	38.00
1000146-03	Spacer									X	.35
1000148-01	CRT Bezel 12"									X	33.00
1000149-01	CRT Lower Shell									X	53.00
1000149-02	CRT Lower Shell, FIS									X	71.50
1000150-01	Rear PNL Assy									X	77.00
1000150-03	Back Panel Exp. Cab.										77.00
1000151-01	Frnt Pnl Assy 32:16									X	77.00
1000151-02	Frnt Pnl Assy XP										77.00
1000151-03	Frnt Pnl Assy PS										77.00
1000152-01	Panel Front CPU									X	67.00
1000154-01	Base CPU									X	105.00
1000155-01	Top cover Assy									X	190.00
1000156-01	Side Panel CPU									X	25.00
1000157-01	Top CPU									X	62.00
1000161-01	Door Erzatz									X	3.00
1000162-01	Disk Door, Tandon									X	2.00
1000163-01	Latch Plate,Flop Disk									X	2.00
1000164-01	Bracket Buss									X	7.00
1000165-01	I/O Plate Blank							X			13.00
1000165-03	I/O Plate CRT							X			13.00
1000165-04	I/O PL 4-RS232							X			13.50
1000165-05	I/O PL 2-RS232							X			14.00

Part #	Part Name	System 1	2	5	10	20	30	Optnl. Spares	Depot Level	As Req	Suggest Ret. Price
1000170-01	Comm B (4Port)							X	1/20		1295.00
1000171-03	Comm A (4Port)							X	1/20		795.00
1000205-01	Cable, LED									X	13.50
1000301-01	Insulator CPU									X	4.20
1000302-01	Screw									X	10/ .60
1000303-01	Screw									X	10/ .60
1000303-02	Screw									X	.14
1000321-03	Conn:Phone:8Pos non Keyed									X	4.00
1000325-01	Clip									X	10/ .35
1000326-01	Washer									X	10/ .35
1000327-01	Captive Screw									X	.70
1000380-01	Disk Bracket									X	16.00
1000395-01	Plug & Harness									X	3.00
1000411-01	Lockwasher									X	10/ .60
1000418-01	WD 20 Wire Cab CPU Exp										15.00
1000419-04	WD 34 Wire Cab CPU Exp										17.00
1000444-01	Video Cont PWA, USA	X	X	X	X	X			1/20		305.00
1000444-03	Video Cont PWA, Int'l									X	340.00
1000447-01	Base FIS									X	149.00
1000448-01	Flex Disk Shield									X	16.80
1000448-02	20MB HD Shield					X				X	16.80
1000449-01	Power Supply Support									X	4/ 1.00
1000454-01	Pad Mem									X	.70
1000454-02	Pad Controllers									X	1.75
1000454-03	Pad HD Shield										1.00
1000601-01	Washer									X	10/ .70
1000602-01	Insert Teflon									X	.25
1000603-01	Teflon pad									X	1.40
1000609-01	Cab, VID, INT CNT									X	18.20
1000611-01	Base FIS									X	54.00
1000615-01	Cable DC PWR IWS									X	5.50
1000635-01	Keyboard Insulator									X	.75
1000636-01	Terminal Block									X	5.30
1000645-01	Door, Disk Shugart									X	4.00
1000646-01	Led, Tandem Flex									X	3.00
1000660-01	Grounding Lug									X	10/ .70

Part #	Part Name	System 1	2	5	10	20	30	Optnl. Spares	Depot Level	As Req	Suggest Ret. Price
1000666-01	Pwr Sup FIS 115									X	320.00
1000666-02	Pwr Sup FIS 230									X	390.00
1001003-01	AC Power Cord X	X	X	X	X	X				X	8.00
1001008-01	Address Plug, Disk									X	2.00
1001023-01	Shield CRT Base									X	16.80
1001111-02	Screen									X	1.40
1001113-01	Cable									X	2.90
1001122-01	Gasket, R.F.I.									X	2.90
1001130-01	Stand-off 20MB HD					X				X	4/ 2.00
1001172-01	HD Shield Right Angle									X	3.00
1001177-01	Central Logic AsmblyXP										2700.00
1001195-01	Keyboard, French										425.00
1001195-02	Keyboard, German										425.00
1001195-03	Keyboard, UK										375.00
1001195-05	Keyboard, Fr/Sws										665.00
1001195-06	Keyboard, Ger/Sws										665.00
1001195-07	Keyboard, Swed/Fin										665.00
1001195-08	Keyboard, Nor/Dan										665.00
1001195-09	Keyboard, Italian										665.00
1001195-10	Keyboard, Span/Port										665.00
1001195-11	Keyboard, Can/French										665.00
1001221-01	Keybaord, Base, Int.										45.00
1001222-01	Keyboard, Cov. Int.										30.00
1001246-01	PWA IWS 256 CHAR SET									X	480.00
1001246-02	PWA IWS 512 Int'l SET									X	530.00
1001612-01	Capacitor Assy HD									X	20.00
1001612-02	Capacitor Assy XP							X			20.00
1001614-01	Clamp, Cap HD Assy									X	.50
1001652-01	CommB 2 Port										995.00
1001672-01	PIO Cont, 2 port									X	1195.00
1001680-01	Base Plt.Expan.Cabinet										35.00
1001695-01	PNL BK ASM IWS 115V									X	120.00
1001695-02	PNL BK ASC 230V									X	120.00
1001717-01	WD Exp.I/O Plate										68.00
1001744-01	Exp.Shld.Disk Shield										23.00
1001755-01	Streamer Tape Drive/Formatter										2100.00
1001759-01	Pwr Suply,Exp.Cab.115										520.00
1001759-02	Pwr Suply,Exp.Cab.230										520.00

SPARE PARTS LIST

Part #	Part Name	System 1	2	5	10	20	30	Optnl. Spares	Depot Level	As Req	Suggest Ret. Price
1001770-01	Front Panel Exp. Cab.										90.00
1001796-01	20 Wire Cab in Exp.										15.00
1001798-01	34 Wire Cab In Exp.										17.00
1001801-01	Data Cable Cab to Cab									X	86.00
1001801-02	Cnt. Cable Cab to Cab									X	142.00
1001812-01	Control Cable Exp.									X	37.00
1001813-02	Data Cable Exp.									X	11.00
1001825-01	Disk Drive Mtg Chassis						X			X	57.00
1001830-02	Cover Disk Drive						X			X	71.00
1001933-01	CentraL Logic AsmblyPS										1700.00
1001948-01	Tape Plug Exp. Cab.										5.00
1001980-01	Disk Voice Coil 20MB										4000.00
1001980-02	Disk Voice Coil 30MB										4500.00
1003008-01	Multi-CommA Proms										75.00

11-15

CHAPTER 11

SPECIFICATIONS

The Fortune 32:16 requires a normal office environment for proper operation. Special provisions for power or cooling are usually not required.

Table 11-1
Physical Specifications

Unit	Height	Depth	Width	Weight
CPU	5.8 in	13.9 in	22.3 in	30 lbs
Keyboard	2.2 in	6.3 in	22.3 in	6 lbs
Monitor	12.9 in	13.7 in	12.3 in	12 lbs
Fortune Intelligent Work Station	13.9 in	13.7 in	12.3 in	15 lbs

Table 11-2
Environmental Specifications

Operating Temperature (outside ambient)	50o F to 104o F 10o C to 40o C
Storage Temperature	15o F to 140o F -10o C to 60o C
Operating Altitude	Sea level to 10,000 feet 0 to 3000 meters
Storage Altitude	Sea level to 39,000 feet 0 to 12000 meters
Humidity	20% to 80% Relative non-condensing

Table 11-3
POWER SPECIFICATIONS

	Low	Nominal	High
Line Voltage	90 VAC	110 VAC	130 VAC
Line Frequency	57 Hz	60 Hz	63 Hz
Line Voltage	190 VAC	230 VAC	270 VAC
Line Frequency	47 Hz	50 HZ	53 Hz
Output Voltage	+ 5 VDC ± 1% + 12 VCD ± 3% - 12 VDC ± 3% + 12 VDC regulated ± 1%		
Current			
Peak surge	30 amps peak surge		
Normal operation	3 Amps at 110 VAC		
Full system low line			
start up	5 Amps		
normal operation	4.6 Amps		

APPENDIX A

DEALER SERVICE GUIDE

DEALER SERVICE PLAN

The following procedures relate to computer retail stores, and software houses, who are referred to as Authorized Fortune Systems Dealers.

The purpose of the service program is to aid Fortune Systems Dealers in the implementation of service capabilities within the framework of their organizations. It is also designed to ensure that the Fortune System is marketed with the total service and support that the end-user might require.

All Fortune Systems are shipped with the following documents:

1. Warranty Registration Card (A-10)
2. Software Registration (A-11)
3. Maintenance Agreement (A-12, A-13)

Warranty Registration Card

When a system is delivered to an end-user, the dealer is required to complete the Warranty Registration Card for each system hardware component i.e., CPU, Keyboard, Monitor, or FIS. The registration card is a three part document, one part is for the end-user, one part is for the dealer and one part is to be returned to Fortune. The copy returned to Fortune will be used to give proper credit to the dealer and up date the customer data base. The warranty period is 90 days from date of purchase, covering both parts and labor.

Software Registration Card

The Software Registration Card must also be filled out by the dealer and signed by the end-user. A copy of this must be sent to Fortune for entry into the data base, and to give credit to the dealer.

Fortune Maintenance Agreement

When a dealer is unable to provide service to an end-user, the dealer will attempt to sell a Fortune Systems Maintenance Agreement (page A-12, A-13) to the end-users who require on-site or depot service. The cities on pages A6-9 show the current service locations.

The current maintenance agreement price list is on page A-14, A-15 & A-16.

In the case of depot service, the end-user is responsible for transportation of the system to and from the depot location. The maintenance fee is payable in advance in quarterly or yearly payments.

If the systems is under an on-site maintenance agreement, Fortune will provide service through the Fortune Dispatch Center which can be called via a toll free 800 number. Only maintenance agreement customers will be given the 800 number and be allowed to place a service call to the dispatch center.

Fortune Maintenance Agreement Con't.

The purpose of the dispatch system is to provide the following:

To give users of the Fortune System under maintenance, one contact for reporting problems.

To ensure that service of the Fortune produce is done in a timely manner. This will be accomplished by logging all calls at the time they are received, and requiring the service organization to report completion times. If a call is not closed within 48 hours, Fortune will contact the organization to ensure completion.

To gather information on common problems which may be solved by better documentation or training.

The dispatch center is operated daily from 6:00 AM to 6:00 PM Pacific time Monday through Friday excluding holidays. It is staffed with trained dispatch personnel who will ensure prompt service in the areas covered by Fortune Maintenance Agreement.

The dispatch operator will have a terminal with access to the following data bases: customer information, service locations and phone numbers, and service history. The dispatch phones will be switchable to hardware and software dispatch specialists.

Service for Maintenance Agreement end-users will be handled in the following manner:

The user calls the dispatch 800 number and the dispatcher enters the call into the system using a dispatch checklist.

If the problem is obviously a hardware failure, the dispatcher will notify the maintenance organization and they will provide on-site service to repair the problem and call the dispatch center close to the call. The Customer Service Report filled out by the maintenance organization will be used to monitor parts inventory and serve as an input document for billing and/or credit information.

If the problem is determined to be software, a search of the known problem file will be made in an attempt to fix the problem at the time of the call. If the problem is not on file, the user will be referred to the Fortune dealer who sold him the software for resolution. In the event the dealer cannot resolve the problem, the dealer will contact Fortune for software support. The software specialist may request that the software be sent to him via mail or teleprocessing. Any software problems caused by non-Fortune software will result in the user being referred to the appropriate vendor.

In the rare event a problem arises that cannot be resolved by diagnostic, phone assistance, or equipment swapping, Fortune may choose to send a Product Specialist to the location for problem resolution. If the problem should be determined to be a design fault there will no charge, otherwise transportation, reasonable living expenses, and Fortunes then current hourly rate will be billed to the service organization.

NOTE: In the event an end-user calls the dispatch center but does not have a valid Maintenance Agreement, he will be referred to his dealer for assistance.

Authorized Service Center Procedures

A Fortune Systems Dealer is required to become an Authorized Service Center or use Fortune's third party service organization in those areas where it is available (see pages A6-9). If no third party service is available for a given area, the dealer must provide service or make arrangements with other dealers in the area to ensure that the end-user is provided adequate support. If any special situation occurs, consult with your Fortune Systems Sales Manager.

The Fortune dealer may choose to become an Authorized Service Center. This means he must enroll a technician in the Fortune hardware training program. Fortune will train one technician per service center free of charge at regularly scheduled classes. Additional technicians may attend class for a charge of $150.00/day. To enroll, consult your Fortune Sales representative for times and locations of classes. Authorized Service Centers will receive $150.00 for each system and $25.00 for each FIS to cover any labor necessary to repair Fortune products during warranty period. They will also receive free part repair from Fortune Systems (see A-4 warranty period).

Limited Service Dealer Procedure

Some Fortune Dealers may choose not to provide hardware service. These dealers must be located in a depot maintenance city (see pages A6-9). These dealers are not required to attend hardware training or purchase a set of spare parts. They will receive a 90 day depot maintenance contract with each system to cover the end-users warranty period. If the limited service dealer chooses to use the unit as a demo system and uses all or part of the warranty period, he must purchase a depot maintenance agreement from Fortune Systems to cover the end-user for 90 days.

Parts

All authorized service centers must purchase a recommended spares kit prior to his first shipment (page A-17). The Dealer will order additional spares based on his need. Parts may be ordered from Fortunes Customer Service Department by phone or mail. A purchase order number is required for all orders. Minimum orders will be for $50.00. All spares shipping charges will be billed to the dealer unless it is a part under warranty.

Fortune Systems will fill normal parts orders within 30 days. Warranty parts will be replaced within 5 days. Dealers are encouraged to keep an adequate supply of spares on hand to service their customers.

Certain low cost parts have been classified as consumables. There will be no repair service available on them because their low cost new is less than the labor required to repair them. Therefore, they will be replaced at a listed replacement cost.

Documentation

Each service center will receive a Field Service Manual, a supply of Customer Service Reports, and Diagnostics Disk when they attend a hardware training class. The Field Service Manual contains the information required to service, configure, and operate the Fortune System for maintenance purposes, and parts lists, and procedures.

Warranty Repairs

If a system component fails during the warranty period, the user will bring his system and all warranty cards to his authorized service center for repair.

After repairing the system the dealer technician will complete a Customer Service Report, remove the top copy for his records and firmly attach the other three copies to the defective part and return it to Fortune for repair. After Fortune has verified that the system was covered by warranty, Fortune will repair or replace the part and return it to the service center at no charge.

Out of Warranty or Non Maintenance Agreement Service

When a system is not covered by either a maintenance agreement or warranty, (i.e., failure caused by obvious tampering or abuse), the user will bring his system to his authorized service center for repair. After repairing the system the technician will complete a Customer Service Report, retain the top copy for his records, and attach the other 3 copies to the defective part and return both to Fortune. Fortune will repair the part and return it to the dealer and bill the dealer according to the current Parts Repair Price List on page A-5. The end-user should be billed for repairs by the dealer at his current rates.

In the event the service center cannot repair a hardware problem, they may call the Tech Support Center and a specialist will assist them.

SUBASSEMBLY REPAIR/EXCHANGE PRICE LIST

PART NUMBER	DESCRIPTION	REPAIR/EXCH PRICE
1000014-01	Comm A (4 Port)	75.00
1000014-02	Comm A (2 Port 1.5 Proms)	75.00
1000014-03	Comm A (2 Port 1.7 Proms)	75.00
1000016-01	Keyboard-Domestic	189.00
1000031-01	Memory PCB-256K	100.00
1000034-01	Memory PCB-128K	80.00
1000042-01	Monochrome Monitor (CRT)	$140.00
1000050-03	PowerSupply-115v	150.00
1000050-04	PowerSupply-230v	150.00
1000058-01	Floppy Disk Drive-5 1/4"	275.00
1000079-01	WD Rigid Disk Controler	400.00
1000081-01	Rigid Disk Drive-5MB	590.00
1000081-02	Rigid Disk Drive-10MB	675.00
1000081-03	Rigid Disk Drive-20MB	826.00
1000171-03	Comm A (4 Port)	75.00
1000444-01	Video PCB-Domestic	100.00
1000444-03	Video PCB-International	100.00
1000497-01	Central Logic Assembly	300.00
1000497-02	Central Logic Assembly	300.00
1000666-01	FIS Power Supply-115v	150.00
1000666-02	FIS Power Supply-230v	150.00
1001132-01/02	Keyboard-International	250.00
1001177-01	Central Logic Assembly XP	300.00
1001246-01	FIS PWA-Domestic	125.00
1001246-02	FIS PWA-International	125.00
1001652-01	Comm B (2 Port)	250.00
1001933-01	Central Logic Assembly PS	300.00
1001980-02	High Perfomance 30MB	1250.00

NOTE: Defective parts are to be returned to Fortune Systems Corporation, freight prepaid, with a completed copy of the Customer Service Report attached.

If an entire system, or CPU, is returned for repair, there will be an additional $60.00 fee to cover deinstall/install and testing. Prior to shipping a CPU an RMA must be obtained from Technical Support.

THESE PRICES GO INTO EFFECT NOVEMBER 1, 1983

CURRENT MAINTENANCE AGREEMENT SERVICE LOCATIONS

Below please find a complete listing of all cities where Fortune Maintenance Agreements are available. Cities that are not currently opened will be as soon as a valid contract is received, spare parts are in place, and technicians are trained for that city. This gear up generally takes thirty days. Depot service is not available in all cities. Please make sure to check individual cities before executing a depot maintenance contract.

If you have any questions regarding a particular city please call Fortune's Field Engineering Department at 415)595-8444.

STATE	SERVICE CITY	CURRENTLY OPENED	DEPOT SERVICE AVAILABLE
ALABAMA	BIRMINGHAM	NO	NO
ARIZONA	PHOENIX	NO	YES
	TUCSON	YES	YES
CALIFORNIA	BAKERSFIELD	NO	NO
	COLTON	YES	YES
	FRESNO	YES	YES
	GARDEN GROVE	YES	YES
	GLENDALE	YES	YES
	SACRAMENTO	YES	YES
	SAN DIEGO	YES	YES
	OAKLAND	YES	YES
	SANTA BARBARA	YES	NO
	SANTA CLARA	YES	YES
	SANTA ROSA	NO	YES
	STOCKTON	YES	NO
COLORADO	DENVER	YES	YES
CONNECTICUT	WINDSOR	YES	NO
	STRATFORD	YES	YES
FLORIDA	N. FT. MEYERS	NO	NO
	JACKSONVILLE	NO	NO
	N. MIAMI BEACH	YES	YES
	ORLANDO	YES	NO
	SARASOTA	NO	YES
	TAMPA	YES	YES
	W. PALM BEACH	NO	NO

STATE	SERVICE CITY	CURRENTLY OPENED	DEPOT SERVICE AVAILABLE
GEORGIA	NORCROSS (ATLANTA)	YES	YES
	ALBANY	NO	NO
	AUGUSTA	NO	NO
	MACON	NO	NO
	SAVANNAH	NO	NO
HAWAII	HONOLULU	YES	YES
IDAHO	BOISE	NO	NO
	IDAHO FALLS	NO	NO
	LEWISTON	NO	NO
	TWIN FALLS	NO	NO
ILLINOIS	BLOOMINGTON	NO	NO
	CHICAGO	YES	YES
	ELMHURST	YES	YES
INDIANA	COLUMBUS	NO	NO
	INDIANAPOLIS	YES	YES
	LAFAYETTE	NO	NO
	SOUTH BEND	YES	NO
	TERRE HAUTE	NO	NO
IOWA	DAVENPORT	NO	NO
	DES MOINES	NO	NO
	SIOUX CITY	NO	NO
KANSAS	WICHITA	NO	NO
	PRAIRIE VILLAGE(KC)	YES	YES
KENTUCKY	LOUISVILLE	YES	NO
LOUISIANA	METAIRIE	NO	NO
MARYLAND	LINTHICUM HTS(BALT)	YES	YES
MASS	BOSTON	YES	NO
	NEWTON	YES	YES
MICHIGAN	JENISON	NO	NO
	SOUTHFIELD	YES	NO
	LIVONIA (DETROIT)	YES	YES
	SAGINAW	NO	NO
MINNESOTA	BROOKLYN PARK	NO	YES
MISSISSIPPI	JACKSON	NO	NO

STATE	SERVICE CITY	CURRENTLY OPENED	DEPOT SERVICE AVAILABLE
MISSOURI	ST. LOUIS	NO	YES
NEBRASKA	OMAHA	NO	YES
NEVADA	LAS VEGAS	YES	NO
	SPARKS	NO	NO
NEW JERSEY	SEACUACUS	YES	YES
	MT. LAUREL	YES	YES
NEW MEXICO	ALBUQUERQUE	YES	NO
NEW YORK	BUFFALO	NO	YES
	MELVILLE	YES	YES
	JOHNSON CITY	NO	NO
	LATHAM	YES	NO
	NEWBURGH	NO	NO
	42 BROADWAY	YES	YES
	270 MADISON AVE.	YES	YES
	ROCHESTER	NO	YES
	SYRACUSE	NO	YES
	WATERTOWN	NO	NO
	HEMPSTEAD	NO	YES
NORTH CAROLINA	CHARLOTTE	YES	NO
	GOLDSBORO	NO	NO
	RALEIGH	NO	YES
	WINSTON-SALEM	NO	NO
OHIO	CINCINNATI	YES	YES
	INDEPENDENCE	YES	NO
	COLUMBUS	NO	NO
	FINDLAY	NO	NO
	CLEVELAND	YES	YES
OKLAHOMA	MIDWEST CITY	NO	NO
	TULSA	NO	YES
OREGON	MILWAUKIE(PORTLAND)	NO	NO
PENNSYLVANIA	ALLENTOWN	YES	NO
	HARRISBURG	NO	NO
	E. PETERSBUGH	NO	NO
	PHILADELPHIA	NO	YES
	PITTSBURGH	YES	NO
	WARREN	NO	NO
	WEST LAWN (READING)	YES	NO
	YORK	NO	NO

STATE	SERVICE CITY	CURRENTLY OPENED	DEPOT SERVICE AVAILABLE
RHODE ISLAND	PROVIDENCE	YES	YES
SOUTH CAROLINA	COLUMBIA	YES	NO
TENNESEE	MEMPHIS	NO	YES
	NASHVILLE	NO	NO
TEXAS	AUSTIN	NO	NO
	DALLAS	YES	YES
	EL PASO	NO	NO
	HOUSTON	YES	YES
	LUBBOCK	NO	NO
	MC ALLEN	NO	NO
	SAN ANTONIO	NO	YES
UTAH	OGDEN	NO	NO
	OREM	NO	NO
	MURRAY	NO	YES
VIRGINIA	ALEXANDRIA	YES	YES
	NORFOLK	NO	NO
	RICHMOND	NO	YES
	ROANOAK	NO	NO
WASHINGTON	BELLEVUE	YES	YES
	SPOKANE	NO	YES
WISCONSIN	MILWAUKEE	YES	NO

LIMITED PRODUCT WARRANTY — CUSTOMER COPY

Fortune Systems Corporation (Fortune) warrants that this product will be free from defects in materials or workmanship for a period of 90 days from the date of purchase, provided that the warranty registration card is signed and returned to Fortune within ten days of purchase. During the warranty period, Fortune or its designated service representative will repair or, at its option, replace any product which is returned by the purchaser to an authorized service center and that is confirmed by Fortune to be defective. In the event the product proves not to be defective or is not subject to warranty protection because of misuse, lapse of time or other reasons, purchaser will be charged for repair or replacement services at Fortune's standard rates. This warranty shall be null and void if the product has been damaged by accident, misuse, misapplication or has been modified or altered by purchaser.

THE FOREGOING WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS. IN NO EVENT SHALL FORTUNE BE LIABLE TO PURCHASER FOR LOSS OF PROFITS, LOSS OF USE, CONSEQUENTIAL OR OTHER INDIRECT DAMAGES OF ANY KIND BASED UPON A CLAIM OF BREACH OF WARRANTY OR OTHERWISE.

SERIAL NO. BAR CODE

Date _____

Dealership Name _____

Dealer's Signature _____

Take this warranty card with you and present it when you require warranty service for this product.

WARRANTY INSTRUCTIONS — DEALER COPY

Serial Number _____ Date of Purchase _____

Customer's Name _____ Phone Number ( ) _____

Street Address _____

City & State _____ Zip Code _____

Fill out, sign, and complete all three parts of this warranty card. The third part of this card, marked "Fortune Systems Copy," must be returned to Fortune to validate the customer's warranty. The customer can then obtain the service provided for by this warranty.

To validate the warranty for a central processing unit, the part marked "Fortune Systems Copy" must be returned *with* the Fortune Systems Corporation Customer Software License Agreement.

Space is provided on the third part of the warranty card for the customer's installation and billing addresses. Customers who purchase only one system usually use the same address for both installation and billing. In this case, list only one address.

The customer must take their copy of the warranty card with them and present it to obtain service under the warranty.

1000818-01

WARRANTY REGISTERATION — FORTUNE SYSTEMS COPY

SERIAL NO. BAR CODE

Date purchased _____

Customer's Name _____ Phone Number ( ) _____

Company Name (if applicable) _____

Street Address _____ City & State _____ Zip Code _____

Bill to Name _____ Phone Number ( ) _____

Mailing Address _____

City & State _____ Zip Code _____

Dealership Name _____ Phone Number ( ) _____

Dealer's Address _____ City & State _____ Zip Code _____

This card must be returned to Fortune Systems.

FORTUNE MAINTENANCE AGREEMENT PRICE LIST
EFFECTIVE MARCH 1, 1984

Part Number of System or Option	Description of System or Option	Onsite Price		Depot Agreement
		Quarter	**Annual**	**Annual**
1000005-02	System Five	$515.00	1905.00	1030.00
1000007-02	System Ten	560.00	2075.00	1120.00
1001028-02	System Twenty	625.00	2315.00	1250.00
1001929-01	PS System Ten	$435.00	1610.00	870.00
1001930-01	PS System Twenty	525.00	1950.00	1050.00
1001925-01	XP System Twenty	645.00	2390.00	1290.00
1001953-01	XP System Thirty	720.00	2665.00	1440.00
1000695-06	30 MB HP Disk Expansion Cabinet	285.00	1055.00	$570.00
1000695-03	20 Tape Streamer	180.00	660.00	360.00
12000091-01	Fortune Intelligent Workstation 1000	50.00	185.00	135.00
Printers				
1000440-05	Letter Quality Printer 3500	153.00	540.00	360.00
1001035-01	Bi Directional Tractor 3500	21.00	76.00	50.00
1001036-01	Cut Sheet Feeder	11.00	39.00	20.00
1001037-01	Cut Sheet Feeder	72.00	260.00	180.00
1001038-01	Twin Sheet Feeder	16.00	58.00	38.00
1000440-08	Letter Quality Printer 7700	200.00	720.00	490.00
1001043-01	Bi Directional Tractor 7700	26.00	94.00	63.00
1001044-01	Cut Sheet Feeder	92.00	330.00	225.00
1001045-01	Twin Cut Sheet Feeder	122.00	440.00	300.00

Note: If customers purchase a maintenance agreement at time of sale and turn in their:
1) maintenance agreement
2) warranty card
3) software license
4) a check for the maintenance agreement
they get a 25% discount for 1st quarter or 10% discount for 1st year.

Applicable State and Local Taxes
For Maintenance Agreements

STATE	STATE RATE	LOCAL TAXES	STATE	STATE RATE	LOCAL TAXES*
Arizona	4% (1)	Variable *	New York	4%	Variable *
Arkansas	3%	None	North Carolina	4%	Variable *
Connecticut	7% (1)	None	Ohio	4%	Variable *
Dist. of Columbia	1%	None	Oklahoma	2% (2)	None
Florida	4%	None	Pennsylvania	6%	None
Georgia	3% (1)	Variable *	South Carolina	4%	None
Hawaii	4%	None	Tennessee	6%	Variable *
Iowa	3%	None	Texas	4% (1)	Variable *
Kentucky	5% (1)	None	Utah	4 3/4%	Variable *
Maryland	5% (1)	None	Virginia	4%	None
Missouri	3 1/8% (1)	Variable *	Wisconsin	5%	None
New Jersey	5%	None	Washington	4.5%	Variable *

* Consult appropriate state and local schedules for applicable taxes.
(1) No Tax on maintenance if customer owns equipment
(2) Labor is taxible if customer purchases equipment

REQUIRED SPARE PARTS KIT
32:16/PS/XP 115V/60HZ

PART NUMBER	DESCRIPTION	PRICE
1003007-01	Spare Kit Domestic	17,300.00
	Includes:	
1000042-01	Video Monitor	
1000444-01	Video Controller	
1000054-01	Fan 115 VAC	
1000050-03	Power Supply 115 VAC	
1001177-01	Central Logic Assembly XP	
1001933-01	Central Logic Assembly PS	
1000058-01	Flexible Disk Drive	
1000081-03	20 MB Hard Disk Drive	
1001980-02	30 MB Voice Coil Hard Disk	
1000079-01	Hard Disk Controller	
1000031-01	Memory 256KB	
1000106-01	Keyboard	
1000017-01	Coil Cord	
	EXPANSION CABINET	
1001759-01	Power Supply 115 VAC	520.00
1000079-04	WD Cont. For Exp.Chassis	1,200.00
	OPTIONAL SPARES	
1001652-01	COMM B (2 Port)	995.00
1000014-02	COMM A (2 Port)	595.00
1000171-03	COMM A (4 Port)	795.00
1000100-01	FIS Logic Assembly	410.00
1000666-01	FIS Power Supply 115 VAC	320.00
1000081-01	5MB Hard Disk Drive	2,000.00
1000081-02	10MB Hard Disk Drive	2,500.00
1000081-03	20MB Hard Disk Drive	3,000.00
1001980-01	20MB Hard Disk Drive HP (VC)	4,000.00
1001980-02	30MB Hard Disk Drive HP (VC)	5,000.00

FORTUNE SYSTEMS CORP.
SERVICE NOTICE INDEX

SERVICE NOTICE NUMBER	DATE	SUBJECT	ACTIVE?
0001	10/18/82	Floppy Disk Read Problems	NO
0002	10/18/82	Shugart Floppy Door Problem	NO
0003	11/01/82	Floppy Disk Door Spacer	NO
0004	11/04/82	Floppy Disk Media Failures	YES
0005	11/04/82	Floppy Disk Replacement Alert	YES
0006	11/04/82	Printer I/O Cable:Caution/Alert	YES
0007	11/04/82	Miniscribe Shunt Block Information	YES
0008	11/04/82	Shugart Address Information	YES
0009A	11/05/82	32:16 Cables (Supercedes Notice 0009)	YES
0010	11/11/82	CRT Failure Replacement Alert	YES
0011	12/28/82	Fortune Terminal:Quick Check Procedure	YES
0012	12/28/82	Diagnostic Paramaters for 20MB Disk	NO
0013	02/16/83	Ampex Address Information	YES
0014A	02/16/83	SIO Port Testing w/ASCII Terminal	YES
0015	03/10/83	New:32:16 Diagnostics, Release 3.0	YES
0015A	03/10/83	New:Floppy Disk Diagnostic-Changes	YES
0015B	03/10/83	New:Hard Disk Diagnostic-Changes	YES
0015C	03/10/83	New:Keyboard/CRT Diagnostic-Changes	YES
0016	03/21/83	Intermittent 120 Errors	YES
0017	03/21/83	Airflow/Cooling Problem	YES
0018	03/21/83	Poor Quality Video	YES
0019	03/30/83	Correction:Seagate Address Information	YES
0020	04/15/83	Power Supply Adjustment Procedure	YES
0021	06/07/83	Optional Capacitor Kit for 20MB	YES
0022	06/07/83	20MB Upgrade Instructions	YES
0023A	09/12/83	Boot Problems	YES
0024A	09/12/83	ID or CRC Problems	YES
0025A	09/12/83	Bad Block Sparing	YES
0026	08/18/83	Motherboard Failure	YES
0027	09/02/83	Failing I/O PAL	YES
0028	01/09/84	Support For Additions to 30MB Exp.Chas.	YES
0029	01/09/84	Running hdtest diagnostics on Drive 1	YES
0030A	01/09/84	Warning - Possible Disk Damage	YES
0031	01/09/84	Verification of Serial Pal	YES
0032	01/09/84	Spare Motherboards/Software Replacement	YES
0033	01/18/84	New Hard Disk Controller 1000079-04	YES
0034	01/18/84	CPU Upgrade Document	YES
0035	01/18/84	Initial Warm Up Before Formatting	YES
0036	01/18/84	Exp. Cab. Software Install Procedure	YES
0037	01/23/84	Western Electric Power Supplies	YES
0038	01/23/84	Systems Problems Due to AC Power	YES
0039	02/10/84	W.E. Pwr Suply Installation Instructions	YES

FORTUNE SYSTEMS CORP.
SERVICE NOTICE INDEX

SERVICE NOTICE NUMBER	DATE	SUBJECT	ACTIVE?
0040	04/20/84	Changes to Service Notice 0023A	YES
0041	04/20/84	Level of WD controller	YES
0042	04/20/84	Intermittent hard disk drive errors	YES
0043	04/20/84	Servicing a 32:16/XP 32:16 w/exp. cab.	YES
0044	04/20/84	Hard disk controller used w/ exp. cab.	YES
0045	04/20/84	Hard disk controller change	YES
0046	05/25/84	Streamer tape full system restore	YES
0047	05/25/84	PS and Disk Drive Identification	YES
0048	05/25/84	3 Disk Drive Systems	YES
0049	05/25/84	FIS 1000 Interchangeability	YES
0050	05/25/84	Streamer Tape Testing	YES
0051	05/25/84	Short Between Conformal Coat. & PS	YES
0052	05/25/84	Streamer Tape Replac.Policy & Proced.	YES
0053	05/25/84	Western Elec.Power Sup.Upgrade Kit	YES
0054	08/17/84	New Loc. of Serial Pal	YES
0055	08/17/84	Streamer Tape - Drive #0 Only	YES
0056	08/17/84	Installing PIO in CommA Slot	YES
0057	08/17/84	CommB Cables	YES
0058	08/17/84	New CPU Cabinet	YES
0059	08/17/84	1 K Ohm Termination	YES
0060	08/17/84	Grinding Int. 5	YES
0061	10/17/84	Disk Mounting Chassis Isolation	Yes
0062	10/17/84	45 Meg Drive Requirements	Yes
0063	10/17/84	Half High Floppy Switch	Yes
0064	10/17/84	Half High Floppy Height Adjustment	Yes
0065	10/17/84	Half High Floppy is Quiet & Dim	Yes
0066	10/17/84	Running Diagnostics on Micropolis 45meg	Yes
0067	10/17/84	New Case/New Screws	Yes
0068	10/17/84	Streamer Tape Cartridges	Yes

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0004

PROBLEM: Floppy disk failures.

SOLUTION: Insure that the diskettes are certified for 96TPI, 80 TRACKS PER SIDE, DOUBLE SIDED, DOUBLE DENSITY.
The following products have been used on the Fortune 32:16

1) DYSAN CORP.
SANATA CLARA, CA. 95051

P/N 204-2D
ORDER NO. 802067

2) VERBATIAM CORP.
SUNNYVALE, CA. 94086

P/N MD557-01
ORDER NO. 18239 SOFT BOX
19242 PLASTIC BOX

3) MAXELL CORP.
MOONACHIE, N.J. 07074

P/N MD2-DD

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 11-4-82

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0005

PROBLEM: CHANGING FLOPPY DISK DRIVES AND INSTALLING A DRIVE FROM A DIFFERENT VENDOR.

SOLUTION: WHEN CHANGING FLOPPY DISK DRIVES, REMEMBER TO CHANGE THE DRIVE TYPE ON THE MAINTENANCE MENU IF THE DRIVE IS FROM A DIFFERENT VENDOR. THIS IS DONE BY HOLDING DOWN THE "CANCEL/DE KEY WHEN FIRST POWERING ON THE SYSTEM, PRESSING THE "F6" KEY, AND THEN SELECTING THE DRIVE TYPE WITH THE "SPACE BAR". YOU SHOULD THEN PRESS THE "F9" KEY TO STORE THE NEW INFOR-MATION ON EAROM.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE NOV 4, 1982

APPROVED_____

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0006

PROBLEM: ATTACHING PRINTERS TO THE SYSTEM USING THE INCORRECT CABLE MAY DESTROY THE PRINTER OR THE POWER SUPPLY IN THE FORTUNE CPU.

SOLUTION: THE SIO PORT AND NEW COMA BOARDS HAVE +12 VOLTS ON PIN 9 AND -12 VOLTS ON PIN 10. ON PRINTERS DESIGNED TO OPERATE IN BOTH PARALLEL AND SERIAL MODE (i.e.IDS) THESE VOLTAGES CAN DAMAGE THE PRINTER INTERFACE OR BE HELD DOWN BY THE PRINTER AND CAUSE FAILURE OF THE POWER SUPPLY IN THE CPU. BE SURE TO USE ONLY THE CABLES SPECIFIED IN THE FIELD SERVICE MANUAL. IF YOU ARE MAKING YOUR OWN OR USING OFF THE SHELF CABLES, BE SURE THEY ARE WIRED AS SHOWN IN THE FIELD SERVICE MANUAL.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE NOV 4, 1982

APPROVED_____

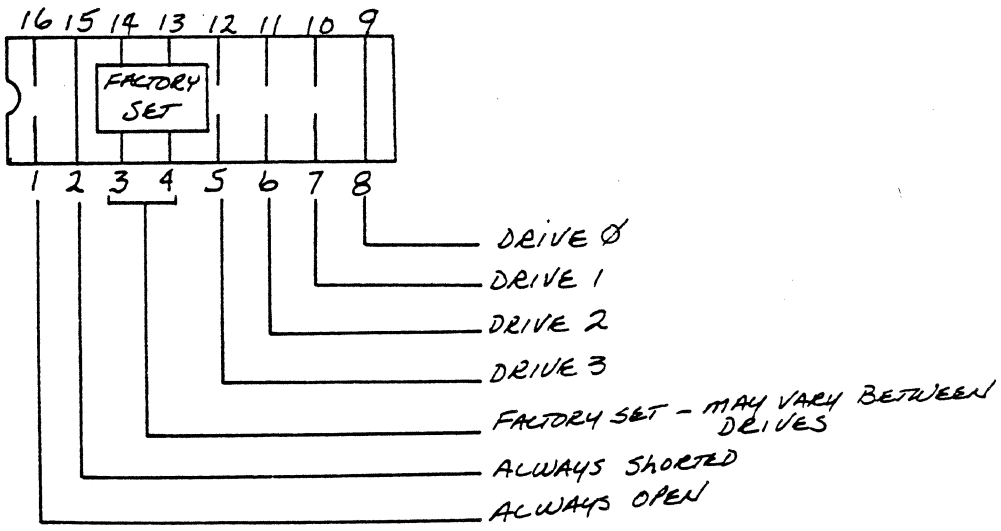
FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0007

PROBLEM: NEW HARD DISK DRIVE FOR THE FORTUNE CPU. FORTUNE IS NOW SHIPPIN
THE "MINI-SCIBE" HARD DISK IN THE SYSTEM AND FOR SPARES.

SOLUTION: SEE BELOW FOR THE PROPER PLUGGING OF THE "MINI-SCRIBE" DISK.



FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE NOV 4, 1982

APPROVED

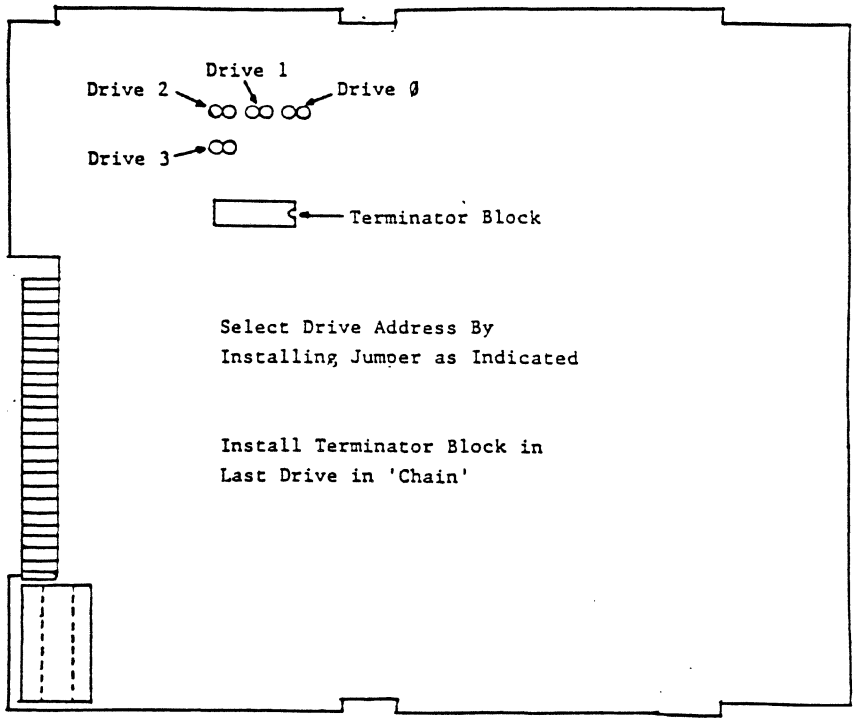
FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0008

PROBLEM: FORTUNE IS NOW SHIPPING "SHUGART" FLOPPY DISK DRIVES IN THE SYSTEM AND AS SPARES.

SOLUTION: BELOW IS THE PLUGGING FOR THE "SHUGART" FLOPPY DISK DRIVE:



FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 11-4-82

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

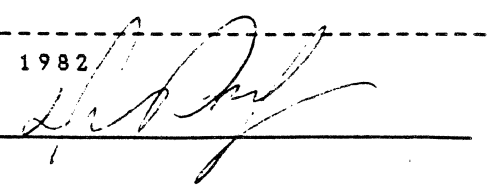
NUMBER 0009 A (To supercede 0009)

PROBLEM: CONFUSION ABOUT THE CABLES TO ATTACH VARIOUS EQUIPMENT TO THE FORTUNE 32:16. CORRECT ERROR IN EARLY FIELD SERVICE MANUALS.

SOLUTION: ATTACHED YOU WILL FIND THE PART NUMBER AND DIAGRAM FOR THE VARIOUS TYPES OF CABLES USED ON THE FORTUNE SYSTEM. PLEASE ENSURE THAT THE DIAGRAMS IN YOUR FIELD SERVICE MANUAL ARE CORRECT. THESE DRAWINGS SUPERSEDE ALL OLDER DRAWINGS.

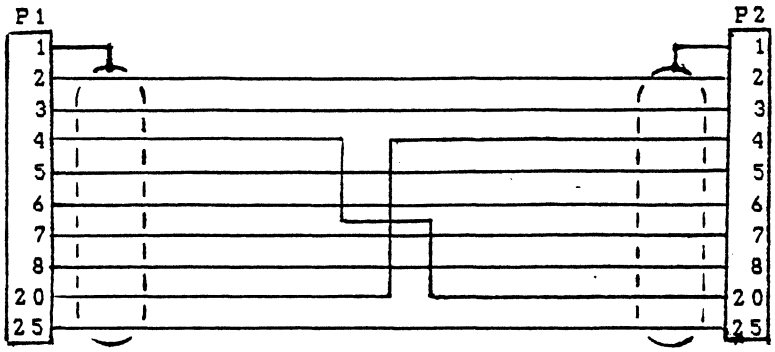
FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE NOV 5, 1982

APPROVED 

PRINTER CABLES

THE FOLLOWING DIAGRAM REFERS TO THE 1000664-XXCABLES THATARE USED FOR PRINTERS ON THE FORTUNE 32:16:

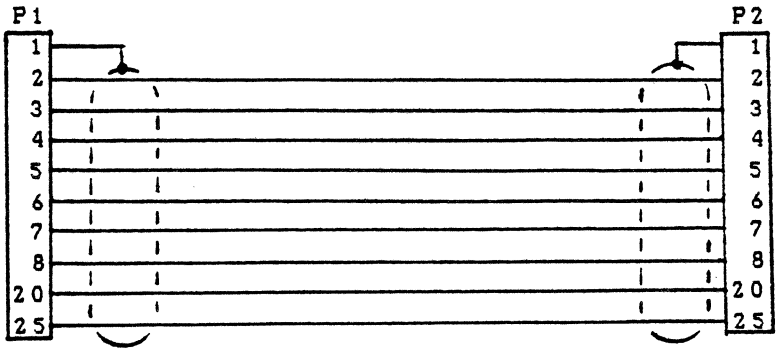


THE ABOVE DIAGRAM HAS THE FOLLOWING PART NUMBERS AND USES:

1000664-01	P1-MALE, P2-MALE	LETTER	QUALITY	PRINTER	LENGTH	10'
-02	P1-MALE, P2-MALE	"	"	"	"	20'
-03	P1-MALE, P2-MALE	"	"	"	"	50'
-04	P1-MALE, P2-FEMALE	DOT	MATRIX	PRINTER	"	10'
-05	P1-MALE, P2-FEMALE	"	"	"	"	20'
-06	P1-MALE, P2-FEMALE	"	"	"	"	50'

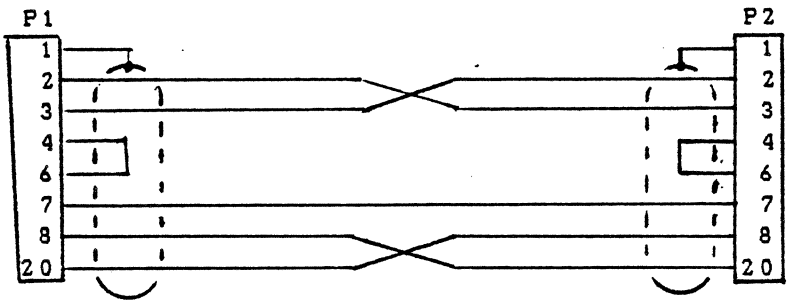
COMMUNICATION CABLES

THE FOLLOWING DIAGRAMS REFER TO THE 1000633-XX CABLES THAT ARE USED FOR COMMUNICATION DEVICES:



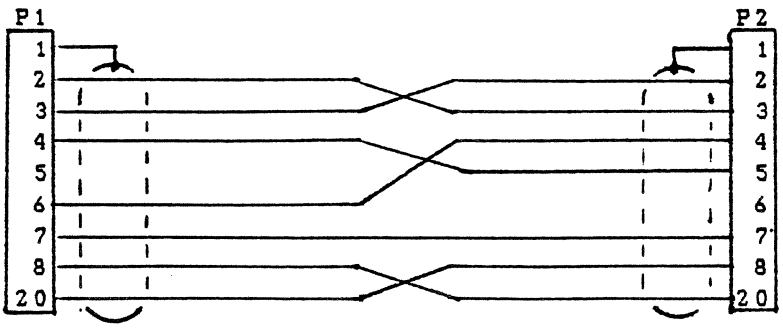
THE ABOVE DIAGRAM HAS THE FOLLOWING PART NUMBERS AND USES:

1000633-01	P1-MALE, P2-MALE	USED FOR CPU TO ASCII TERMINAL	LENGTH 1
-02	P1-MALE, P2-FEMALE	USED FOR EXTENSION CABLE	" 1
-03	P1-MALE, P2-FEMALE	" " " "	" 2
-04	P1-MALE, P2-FEMALE	" " " "	" 5
→ -08	P1-MALE, P2-MALE	USED FOR CPU TO ASCII TERMINAL	" 2
→ -09	P1-MALE, P2-MALE	" " " " " "	" 5



THE ABOVE DIAGRAM HAS THE FOLLOWING PART NUMBERS AND USES:

1000633-05	P1-MALE, P2-MALE	CPU TO CPU	LENGTH 10'
-06	P1-MALE, P2-MALE	CPU TO CPU	" 20'
-07	P1-MALE, P2-MALE	CPU TO CPU	" 50'



THE ABOVE DIAGRAM HAS THE FOLLOWING PART NUMBERS AND USES:

1000633-10	P1-MALE, P2-MALE	CPU TO MODEM	LENGTH 10'
-11	P1-MALE, P2-MALE	" " "	" 20'
-12	P1-MALE, P2-MALE	" " "	" 50'

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0010

PROBLEM: POSSIBLE PROBLEM OF SHORTING OUT THE ANALOG PCB WHEN CHANGING CRT.

SOLUTION: BE SURE THAT THE CONFORMAL COATING (THE GRAY COATING ON THE INSIDE OF THE COVER) ON THE STAND-OFF'S FOR THE ANALOG PCB IN THE CRT HOUSING HAS BEEN REMOVED. SOME ASCII TERMINALS AND MASTER CONSOLE CRT'S WERE SHIPPED WITH-OUT THE COATING REMOVED. IF THE CRT IS REPLACED WITH A DIFFERENT VENDOR TYPE CRT, THE ANALOG PCB MAY SHORT TO THE CONFORMAL COATING.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE NOV 11, 1982

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0011

PROBLEM:A quick way to check out a Fortune Intelligent Work Station.

SOLUTION:Jumper pins 2 and 3 of the host connector together. Then any character input from the keyboard will be echoed to the CRT screen.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 12-28-82

APPROVED

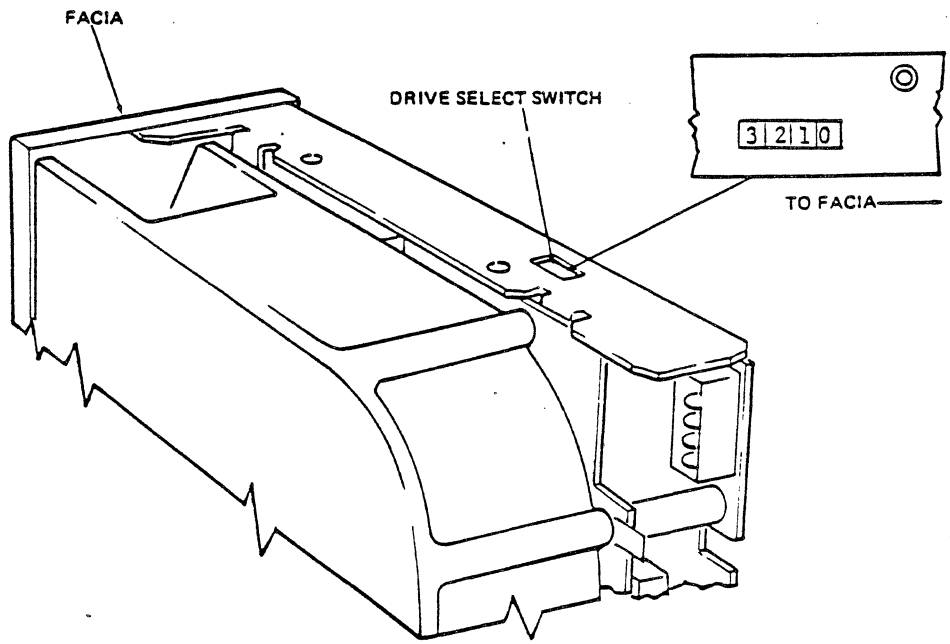
FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0013

PROBLEM: Fortune is now shipping AMPEX PYXIS Model 27 (20 Meg) hard disk.

SOLUTION: Below is the addressing information.



To identify a drive, the pole corresponding to the address of the drive is closed. Only one pole in each drive can be in the closed position.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 9/16/82

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0014A

PROBLEM: This Service Notice is intended to describe the procedure for exercising the Fortune 32:16 SIO PORT using an ASCII Terminal.

-NOTE-

On all FIS1000's with 1001246-XX motherboards or 1000100-XX motherboards above Rev. 5, this procedure will not work using the standard Fortune cable. Pin 5 (clear to send) has to be open for this procedure to work.

SOLUTION: 1. Cable the ASCII Termimal Host Port to the 32:16 SIO Port.

2. Reset or power up the 32:16 while holding down the cancel/del key. The Maintenance menu will appear.

3. Set the ASCII Terminal Baud Rate switches to match the back port speed of the 32:16 (F2 on the Menu). Remember to turn the ASCII Terminal off/then on after changing switches.

4. Press the F3 key. Press the space bar until the power-up action changes to "Terminal Mode". Press the execute key.

5. The 32:16 is now ready to communicate with the terminal. Data entered on the 32:16 keyboard is displayed on the ASCII Terminal display, and data entered on the terminal keyboard is displayed on the 32:16 CRT. Enter several lines on each device and verify that the corresponding display is correct.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Horace Wayne Painter 8/17/84
FLD.ENG.
APPROVED _____
HDW.ENG.
APPROVED _____
SFT.ENG.
APPROVED N/A

SERVICE NOTICE

NUMBER 0015

PROBLEM: Notification of new release of Field Engineering 32:16 diagnostics. PART NUMBER: 1000834-02

SOLUTION: New release of diagnostics has improvements to:

1. Floppy Disk Diagnostic
2. Keyboard/CRT Diagnostic
3. Hard Disk Diagnostic

The name of the Floppy Disk Diagnostics was changed from "fdmenu" to "fdtest.

The name of the Keyboard/CRT Diagnostics was changed from "kbdcrt" to "kbtest".

The name of the Hard Disk Diagnostic was changed from "fids" to "hdtest".

No changes were made to the "mem", "mmu", or "coma" diagnostics.

See the following pages for instructions.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/10/83

APPROVED

SERVICE NOTICE

NUMBER 0015A

PROBLEM: Changes to Floppy Disk Diagnostic "fdmenu".

NOTE: "fdmenu" has changed to "fdtest".

Reference: Pages 7-9 to 7-12 of Field Service Manual for the following changes.

SOLUTION: Select the Floppy Disk Diagnostic using file name "fd02/fdtest".

The only change to this diagnostic was made to the Read Cycle Test. This test no longer does a data comparison test. CRC verification is done on all blocks read. This is a good media test. Use to read suspect floppy disks.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/10/83

APPROVED

SERVICE NOTICE

NUMBER 0015B

PROBLEM: Change to Hard Disk Diagnostic "fids".

NOTE: "fids" has changed to "hdtest".

Reference: Pages 7-13 to 7-19 of the Field Service Manual for the following changes.

SOLUTION: Select the Hard Disk Diagnostic using file name "fd02/hdtest"

The diagnostic now defaults to slot "E" instead of slot "B". The diagnostic now uses the same device codes as the operating system.

DRIVE TYPE:

A10 - Seagate 10 meg
B5 - Miniscribe 5 meg
B10 - Miniscribe 10 meg
B20 - Miniscribe 15 meg
C20 - Ampex 25 meg
E15 - IMI 15 meg
G25 - ATASI 25 meg
H25 - Evotek 25 meg
I20 - Disctron 20 meg
Z5 - Seagate 5 meg
OTHER - Make your own parameters.

The diagnostic now uses the "Down Arrow" key to move the cursor on the main menu. Press the "Down Arrow" key twice to move the cursor to the drive type.

The diagnostic now uses the "Right Arrow" key to change the drive type.

EXAMPLE: Press "Right Arrow" key four (4) times to change drive type to C20 (Ampex 20).

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/10/83

APPROVED

For systems running Operating Systems 1.2.4. and above, after selecting the drive type all options are default values. You do not have to change the step rate for the (Z5) Seagate 5 meg or add parameters to the (C20) Ampex 20 meg.

For systems running Operating System 1.2.3., all options are default except for the (C20) Ampex 20 meg. You must change the end block count from 43655 to 43519. This is because the diagnostic uses 321 cylinders and 1.2.3. only uses 320 cylinders.

For systems Below 1.2.3., you have to do an "init" command and change the number of blk/Track from 17 to 16. This is because the diagnostic uses 17 blocks per track and the older operating systems used 16. You can find the operating system level using "pstat" under Unix.

HELPFUL HINTS

1. I20 is the Disctron 20 meg designation. A few, approximately 30, systems left the plant with an F20 on the system configuration sticker as the hard disk drive type. If you see an F20, change it to read I20.

2. The Disctron 20 meg systems have a capacitor mounted on the back of the hard disk shield. Do not try to run a Disctron without this capacitor.

3. Operating systems below 1.2.4 cannot be run on Disctron 20 meg systems.

4. After a sucessful completion of a sequencial test, run a few minutes of random testing. To do this change the test mode = random and the loop count = 9999.

5. Soft errors are recoverable errors of the disk system. A few are normal, alot are unusual and the cause should be found. Hard errors are unrecoverable. Remember, the operating system uses bad block forwarding and the diagnostic does not. Always check the configuration block of the hard disk using rdconf /dev/hd02 (under Unix) to find the true bad blocks of a hard disk.

SERVICE NOTICE

NUMBER 0015C

PROBLEM: Changes to keyboard/CRT test "kbdcrt".

NOTE: "kbdcrt" has changed to "kbtest"

Reference: Page 7-8 of the Field Service Manual.

SOLUTION: Select the keyboard/CRT test by selecting file name "fd02/kbtest".

The CRT Scroll Test now will test either a domestic or an international CRT. The default is domestic. If you change the default to "No" the international test will be run.

The CRT Atribute Test still tests all of the atribute functions.

The keyboard test has changed drastically. You will like this one alot better. The keyboard test will test the following types of keyboards.

AM - American
BR - British (U.K.)
FR - Francaise
DE - Deutsch
IT - Italian
SV - Sverige
NO - Norge
SR - Swisse - Romande
SD - Schweiger - Deutsch

Use the first two (2) uppercase letters of the type of keyboard you have.

EXAMPLE: AM (Return) will select the domestic keyboard.

The screen displays an outline of all the keys on the selected keyboard. Press each key on the keyboard. As you press a key, the same location on the outline should change to the letter on the key top.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 5/10/83

APPROVED

NOTE: To remove the special keys (CTRL, LOCK, SHIFT), press these keys:

(CTRL) - Hold down (CTRL) and press 'q'
(LOCK) - Hold down (LOCK), then press 't', then to unlock the keyboard release and press (Lock) again.
Right (SHIFT)- Hold down right (SHIFT) and press 'h'.
Left (SHIFT)- Hold down left (SHIFT) and press 'g'.

If the keyboard will not remove all the keys, you can press the (Return) key next to the far right number keys at the same time holding down the (SHIFT)key. This will abort the test..

The keyboard driver test has been removed.

The cursor positioning test now gives you a boot prompt after the screen is filled with "X's".

You do not have to reset to exit.

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0016

PROBLEM: Intermittent 120 Errors.

SOLUTION: When after running all diagnostics your systems still get Intermittent 120 errors, try replacing the floppy pal (coordinates 9F on the motherboard) before replacing the motherboard. Order floppy pals through Field Engineering.

Fortune System Corp.
300 Harbor Blvd.
Belmont, CA 94002
Attn: Angie Alvarez

NOTE: Floppy pals labeled .1 CPU FLO have been screened for this problem and do not need to be replaced.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/21/83

APPROVED _____

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0017

PROBLEM: Reduced airflow because of a poor fan voltage connection.

SOLUTION: After servicing the Fortune 32:16, always check the voltage connection at the fan and make sure it is tight before buttoning up the machine. After button up always turn on the machine and check for proper air flow before returning to the customer.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/21/83

APPROVED

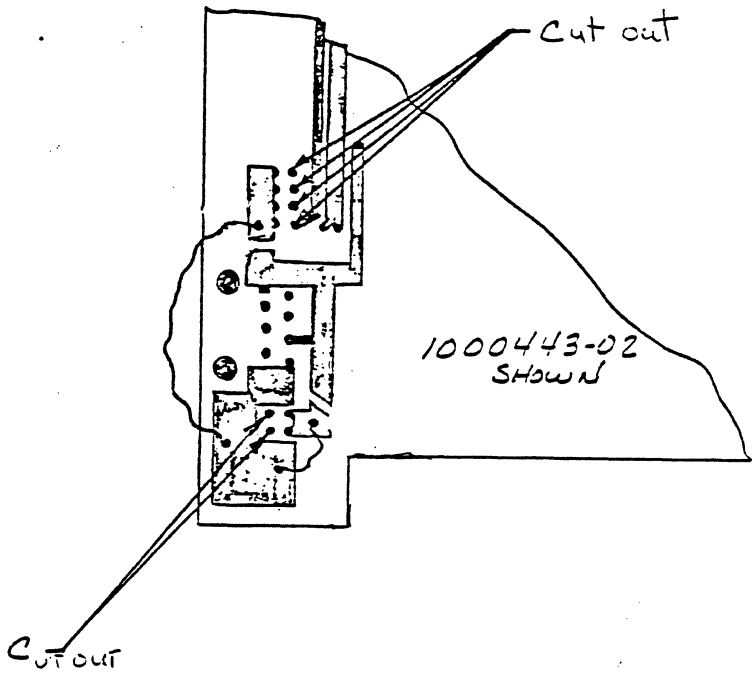
FORTUNE SYSTEMS CORP

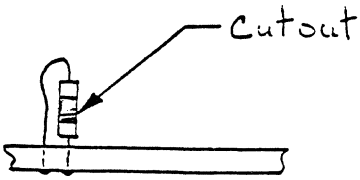
SERVICE NOTICE

NUMBER 0018

PROBLEM: Poor quality video on CRT monitors and reduced range of contrast adjustment on CRT controller.

SOLUTION: Some video controllers have six capacitors, C4-C9, located in the area of P2. If you experience either of the above problems check to see if these capacitors are installed. If installed, cut out.





FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 3/21/83

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0019

PROBLEM: Drive selection and terminator block locations shown incorrectly for Seagate ST506 and ST412 drives.

SOLUTION: Remove page 6-7/6-8 Revision 01-83 from the Field Service Manual and replace with page 6-7/6-8 Revision 02/83.
Note that the terminator resistor pack and drive selection shunt were reversed in the old drawing.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE March 30, 1983

APPROVED Howard W. Painter

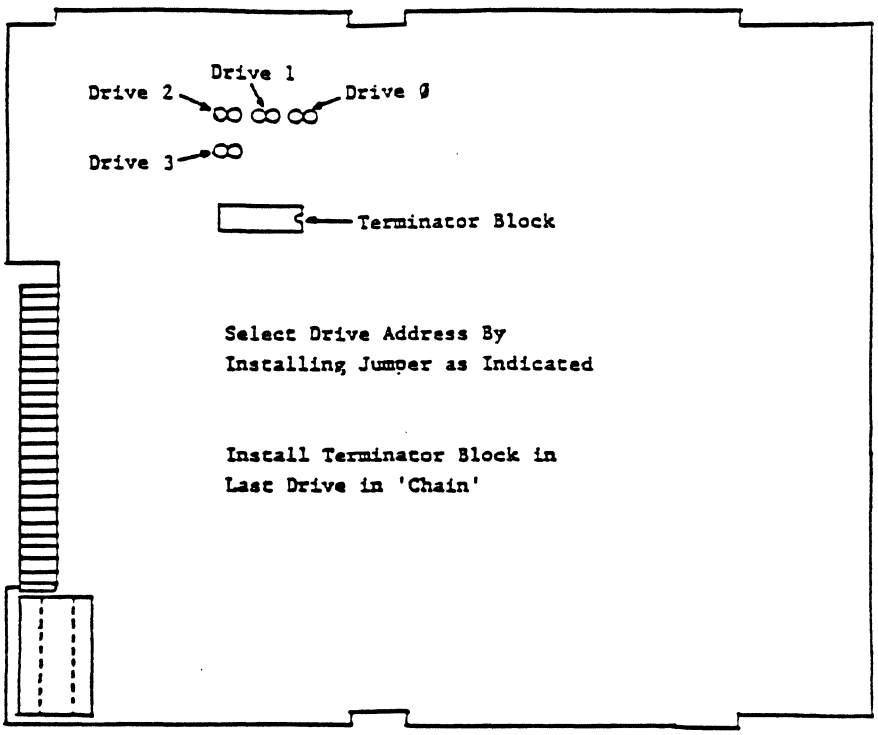


Figure 6-7
Shugart Disk Drive Configuration Guide

HARD DISK DRIVES

Up to four hard disk drives can be installed on a system. The disk drives can be any combination of 5MB, 10MB, or 20MB disk drives connected to the WD hard disk controller. While the WD Controller will work in any option slot, the best has been found to be slot E where there is more airflow for better cooling. Each disk drive is connected to the same serial data cable, and an individual radial cable as shown in figure 6-10.

Strapping for each disk drive is shown in figures 6-8 and 6-9. The disk drive physically located at the end of the serial cable must contain the terminator block. More than one terminator block or a missing terminator block will cause intermittent data errors

To connect multiple hard disk drives to a system, changes must be made to the operating system. Contact Software Support for guidance.

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0020

PROBLEM: 32:16 System Power Supply Adjustment Procedure.

SOLUTION:

1.0 GENERAL

Voltage levels at the +5 volt, +12 volt and -12 volt outputs are controlled by one common adjustment and those voltages are affected by current draw at each output. Certain supplies may require some readjustment as the +5 volt current draw is increased. Adding additional memory and/or options increases the +5 volt current draw.

2.0 VOLTAGE SPECIFICATION

Voltages should be adjusted to achieve the range shown in Table 1. These voltages are specified at the connector that plugs into the motherboard. The connector pin numbers for the various voltages are also shown in Table 1.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE_____

APPROVED_____

OUTPUT NAME	OUTPUT VOLTAGE TOLERANCE RANGE Min.	MAX.	CONNECTOR PIN NUMBERS	WIRE COLOR
+5V	4.90	5.25	1, 2, 3 , 4, 5	RED
+12V	11.40	12.60	6	YELLOW
-12V	11.40	12.60	8	VIOLET
+12V Reg	12.00	13.20	10	WHITE YELLOW
GROUND	-0-		11, 12, 13, 14, 15, 16	BLACK

TABLE 1

WARNING

HIGH VOLTAGE IS PRESENT AT VARIOUS POINTS ON THE POWER SUPPLY. CARE SHOULD BE EXERCISED TO AVOID TOUCHING ANY EXPOSED COMPONENT LEADS, HEAT SINKS, ETC.

Air flow through the system is affected by removal of the cover. The system should not be powered up for more than 30 minutes with the cover off.

3.0 PROCEDURE

Equipment required for this procedure is a digital voltmeter (.01 volt graduation) and a non-conductive flat blade 6 inch adjustment tool. Cover should be removed and all options plugged in before AC power is applied. Remove all potting material on adjusting screw with power off and AC cord unplugged.

3.1 +12 VOLTS

Check the +12 volt output, it should be less than 12.60 volts. If it is above, adjust potentiometer R26 (see Figure 1.0) until voltage is 12.60 volts.

3.2 +5 VOLTS

Check the +5 volt output, it should be above 4.90 volts. If it is below 4.90 volts, and +12 is at 12.60, reject the power supply. If the +12 is less than 12.60, raise the +5 until it reads 4.90 to 5.00 making sure the +12 does not go above 12.60.

3.3 +12 VOLTS REGULATED

Check the +12 volt REG output, it should be greater than 12.00 volts. If the voltage is less than 12.00 volts, the size of the display area on the system monitor should be checked. If the display is acceptable, the supply can be used if the output is above 11.60 volts.

3.4 -12 VOLTS

Check the -12 volt output, it should be between -11.40 volts and -12.60 volts. This supply is used only for RS232 type communications options at this time. If the system includes only RS232 type options (Comm A or Comm B), the supply will be acceptable if the -12 volt output is as low as -13.00 volts.

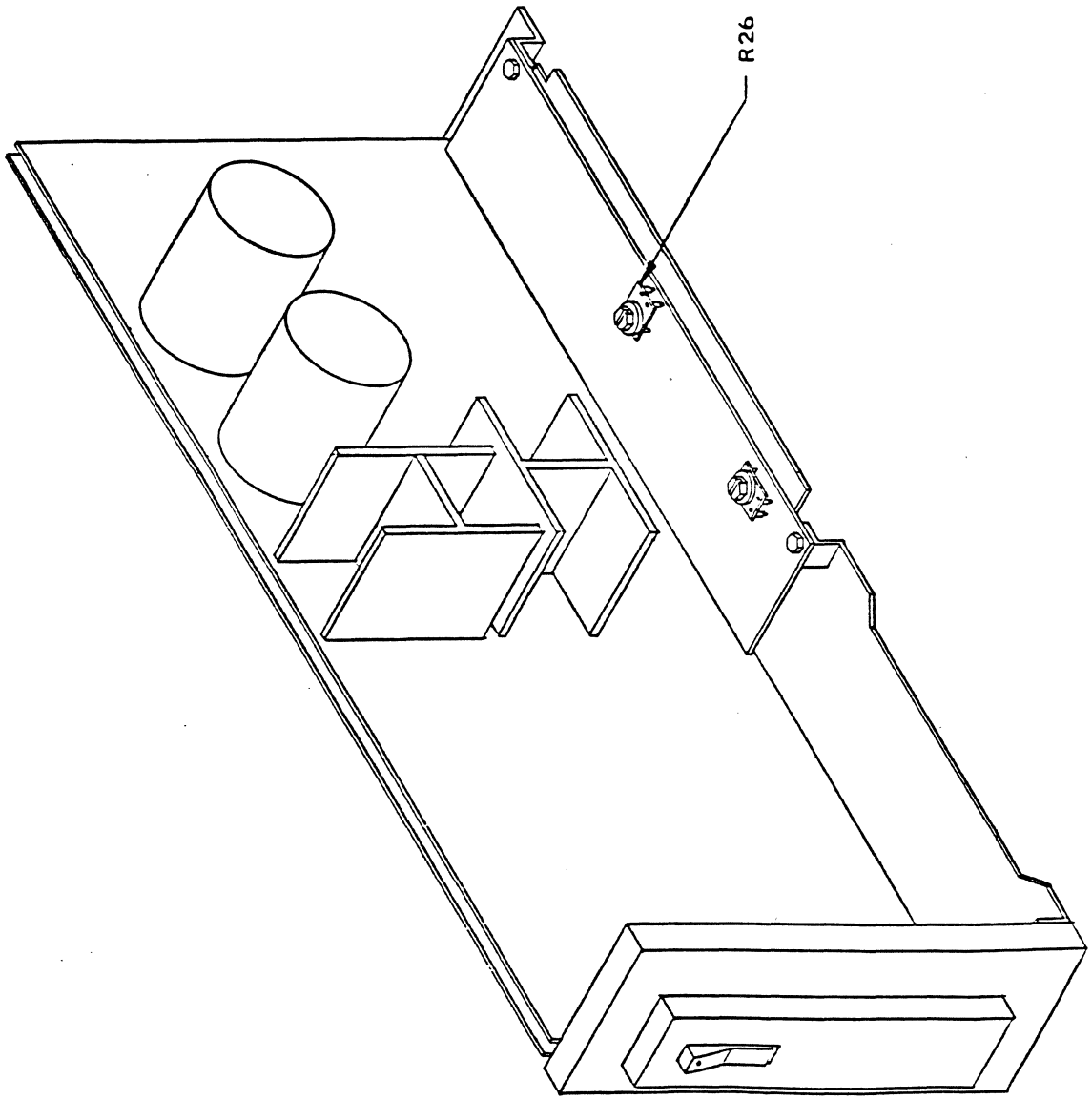


FIGURE 1.0

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0021

PROBLEM: Announcing an optional capacitor kit for 20 megabyte systems.

Only order the kit, part #1001775-01, if the 20 megabyte system is experiencing intermittent hard disk/floppy disk problems.

SOLUTION: Install capacitor assembly, part #1001612-01 between hard disk power plug from power supply, and hard disk power plug on drive.

Secure capacitor assembly to back of hard disk shield using clamp, part #1001614-01. Use 1 (6X32 3/8" pan head) screw and 1 each #6 lockwasher and flat washer. The shield is tapped at the rear for a 6X32 screw.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 6/7/83

APPROVED Howard W. Pinta

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0022

PROBLEM: 20 megabyte upgrade instructions.

SOLUTION: Before proceeding to upgrade a 5 or 10 megabyte system make sure you have the following parts available.

	PART#		QUANTITY
	1000081-03	20MB Disk Drive	1ea.
	1000380-01	Disk Mounting Bracket	1ea.
	1000448-02	Shield, 20MB	1ea.
	1001172-01	Shield, Hard Disk	1ea.
	1001130-01	Standoffs	4ea.
	1000411-01	Lockwasher #6	5ea.
	1000303-07	Screw,Pan Head 6X32 3/16"	6ea.
	1001612-01	Capacitor Assembly	1ea.
	1000303-01	Screw,Pan Head 6X32 3/8"	1ea.
	1000326-01	Washer,Flat #6	1ea.
	1001614-01	Clamp	1ea.
**	1001051-01	Screw,Under Cut,6X32 1/4"	4ea.
	1000454-03	Insulator	2ea.
** or	1000303-02	Screw,Pan Head 6X32 1/4"	3ea.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 6/7/83

APPROVED Howard W. Painter

These parts can be ordered under one part number, #1001700-01 (20MB Upgrade Kit).

STEP 1

Remove the old drive from the system.

STEP 2

If the original disk mounting bracket has the same number of holes as the new one, you do not have to remove the floppy disk drive from the disk mounting bracket. If the original disk mounting bracket has fewer holes than the new one, install the floppy disk drive on the new mounting bracket and discard the old mounting bracket.

STEP 3

Install the four standoffs on the bottom of the 20 meg drive.

STEP 4

Install the large shield on the 20 meg drive using the 3 (6X32 1/4" pan head) screws. Leave the left rear screw hole blank. If the under cut 6X32 1/4" screw was supplied, use it instead.

STEP 5

Install the 20 meg disk drive onto the disk mounting bracket using the third and last (from the front) set of holes. Use 4 (6X32 3/16" pan head) screws and 4 (#6) lock washers.

STEP 6

Install the disk assembly into the system.

STEP 7

Install the capacitor assembly onto the back of shield using the clamp with a (6X32 3/8" pan head screw, #6 flat and lockwashers). The capacitor assembly electrically goes between the disk power supply connection and the 20 meg disk drive.

STEP 9

Install the two insulators on the small shield, one on the top and one on the side.

STEP 9

Install the small shield to the large shield using the two remaining (6X32 3/16" pan head) screws.

STEP 10

Test using hdtest. See Service Notice #15.

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0023A

PROBLEM: Boot problems caused by missing or damaged 'Configuration Block' or 'Boot' file.

If during the normal boot procedure the system shows one of the following abnormal conditions:

1. Screen shows '1 2' and goes no further.
2. Screen shows '1 2 3' and goes no further.
3. The message "There's something wrong, start over" appears at the bottom of the screen.
4. Goes to the "Maintenance Menu" and continually returns to the "Maintenance Menu" after pressing the 'execute' key.

It may mean that the 'Boot' program or the 'Configuration Block' may have been damaged. Rewriting the 'Boot' or 'Conf Block' may solve the problem without having to 'Cold Boot' the system.

Determine if the 'Conf Block' is damaged by booting up from floppy disk (i.e. Cold Boot #1). If the message "hd: Drive 0 is bad" appears, the 'Conf Block' on the rigid disk cannot be read.

Determine if the 'Boot Program' is bad by changing the 'Boot Device' (F4) on the maintenance menu to boot from floppy drive, and install 'Cold Boot #1'. If the system comes up normally after reading the boot from floppy, the 'Boot' on the rigid disk is damaged.

SOLUTION: First run diagnostics to determine that the hardware is OK. If 'hdtest' runs OK, then you can proceed to rebuild the 'Configuration Block' or the 'Boot' program on the rigid disk.

Rebuilding Configuration Block

There are two things you need to know before rebuilding the 'Conf Block'. The number of users the disk was formatted for, and any 'Bad Blocks' that were spared in the original 'Conf Block'. It is advised that on any systems you sell or do service on, that you do the command **rdconf /dev/hd00** and record the information concerning bad blocks that are spared and the size of the partitions **BEFORE ANY PROBLEMS OCCUR**, so that if the following procedures are required you will have all the information you need. Also note the number of users specified at the time of 'Cold Boot'.

Only proceed to rebuild the configuration block if you had recorded the bad blocks and number of users.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA. 94070

DATE Nov 20 1983

APPROVED

Service Notice 0023A Continued

----NOTE----

In the following write-up, all references to 'disk type' will be 'XYY'. You would substitute the the correct value for the disk type you are working with (i.e. A10, B10,C20, I20, Z5 etc..).

PROCEDURE: Start a normal 'Cold Boot' bringing the system all the way to the menu that asks you to select F1, F2, or F3 to reload the system. You will note that the last message says that anything else will be treated as a 'maintenance mode' command. At this point enter;
cd /etc <RETURN>
This will cause the system to change the working directory to /etc and return with the # prompt. At this time enter;
dskselect XYY <RETURN> Example: Use C20 for XYY if you have a C20 system.
A menu will appear asking you to select a disk type. Enter the number that corresponds to the drive type in your system. Example: **10 <RETURN>** for a C20 system.
You will now enter;
mkconf -i XYY /dev/hd00 <RETURN>
The 'Configuration Block' will now begin to appear on the CRT with '?' prompts. Press the <RETURN> to enter the default value until you get the question 'Number of Spare Blocks =0'?, at this point enter;
46 <RETURN>
The system will now be set to spare any known bad blocks, and will return the message 'Spare 0 (Block 3)= free ?' If you have any known bad blocks you would enter the first bad block number here and hit <RETURN>. You would continue to do this for all bad blocks. If there are no bad blocks or when you have entered all known bad blocks, you will enter **'bad'** for the remainder of the spares entries. When you make the last entry, the system will automatically write the new 'Conf Block' to the rigid disk. The disk now has a 'Conf Block' for a one (1) user system. If the system was formatted for a 3 or 5 user system, do the following command;
mkconf -U * /dev/hd00 <RETURN>
where * is the number of users (i.e. 3 or 5). You should now check the 'Conf Block' by doing the following command;
rdconf /dev/hd00 <RETURN>
If all went well, you should have a working hard disk at this point. Do a file system check to verify system file integrity, enter;
fsck /dev/hd02 <RETURN>
The file system check should run error free. If not, you have file damage and a cold boot may be in order.Enter the following commands;
sync <RETURN>
sync <RETURN>
You may now remove the 'Cold Boot' disk and reboot the system in the normal configuration.

Rebuilding Boot Program

PROCEDURE: Start a normal 'Cold Boot' and bring the system up to the point where it displays the menu that asks you to select F1, F2 or F3 to reload the system. You will note that the last message says that anything else entered will be treated as a 'maintenance mode' command. At this point enter the following;

cd /etc <RETURN>

This changes the working directory to /etc and the system will return with a # prompt. You will now enter the following;

bootcp /sa/boot /dev/rhd00 0 <RETURN>

The system will now write the 'Boot' program from floppy to the hard disk and return the # prompt. You will then enter;

sync <RETURN>
sync <RETURN>

and remove the 'Cold Boot' disk and bring up the system in the normal manner to verify operation.

If when you entered **bootcp.....** the system returned the message **bootcp; not found,** enter the following command;

dd if=/sa/boot of=/dev/hd00 bs=512 seek=* <RETURN>

and then proceed as above.
For the * parameter use the starting block number of the boot 0 program. This information is available in the configuration block. The "Boot 0 begins at" message gives the starting block number that should be used for this parameter. To see the configuration block enter;

rdconf /dev/hd00 <RETURN>

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0024A

PROBLEM: Rigid Disk Error messages of 'ID not found' or 'CRC Error'.

First you must know what 'ID" and 'CRC' mean. The 'ID Fields' on the disk are the headers for the data blocks, which contain the cylinder, head and sector information. 'CRC' stands for 'Cyclic Redundency Check' which is the way we check for errors in the 'ID Field'.

If an error occurs in the 'ID field' we must reformat, that is, rewrite the cylinder, head and sector information for that section of the rigid disk drive.

-NOTE-

ALL DATA WILL BE LOST IN THE AREAS THAT ARE REFORMATTED

For this reason only the boot program area of partition 0 and all of partition 1 can be reformatted. The danger of losing data and pointers is to great to allow reformatting of other areas. The boot program area and partition 1's area are shown in the configuration block of the rigid disk drive. If other areas of the disk have ID errors a cold boot will be necessary.

SOLUTION: Since both hdtest (diagnostic) and unix (operating system) give error information in blocks, and the format command needs track (t) and head (h) information we need to be able to convert blocks to tracks and heads.

To convert you need to know the sectors/track and number of heads for your particular operating system/disk drive combination. This information is available in the configuration block of the rigid disk drive. How to read the configuration block will be shown later.

-NOTE-

DRIVES HAVE VARIOUS NUMBERS OF HEADS AND SECTORS PER TRACK

After you have the sectors/track (sectors per track) information and the number of heads information, multiply them together.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE Aug 2, 1983

APPROVED

EXAMPLE:

Unix 1.2.4 operating system and a 20 megabyte C20 disk drive
sectors/track = 17
number of heads = 8
136 (blocks per cylinder)

EXAMPLE:

Unix 1.2.4 operating system and a 10 megabyte B10 disk drive.
sectors/track = 17
number of heads = 4
68 (blocks per cylinder)

Take this number (blocks per cylinder) and divide it into the failing block(s) number. The result is the track (t) number you need for the format command. Divide the remainder by sectors/track (sectors per track). This result is the head (h) number you need for the format command.

EXAMPLE:

Block 128 is bad on a 1.2.4 system with a C20 disk drive.

```
    0= Track (t)          7= Head (h)
136) 128              17)128
                          119
remainder=128               9
```

With this example the format command would reformat one entire track, from block 119 to block 135. 17 blocks total reformatted.

EXAMPLE:

Block 1000 is bad on a 1.2.4 system with a B10 drive.

```
   14= Track (t)          2= Head (h)
68)1000               17) 48
   68                     34
   320                    14
   272
remainder=48
```

With this example the format command would reformat one entire track, from block 986 to block 1002. 17 blocks total reformatted.

Now that we have track (t) and head (h) information we can use the following reformat procedure to restore the 'ID Field' on the rigid disk drive.

PROCEDURE FOR REFORMATTING:

Start a normal 'cold boot' bringing the system all the way to the menu that asks you to select F1, F2, or F3 to reload the system. You will note that the last message says that anything else will be treated as a 'maintenance mode' command. At this point enter;
cd /etc <Return>

This will cause the system to change the working directory to /etc and return with the # prompt. At this time enter;
rdconf /dev/hd00 <Return>

The rigid disk configuration block will appear.

-NOTE-

CHECK TO SEE THAT THE AREA YOU WANT TO REFORMAT IS IN THE BOOT PROGRAM AREA OR PARTITION 1. ONLY PROCEED IF IT IS.

This is where you find the sector/track and number of heads information that you needed for the block to track (t) and head (h) conversion. Do your conversion and proceed as follows. Enter;
format -t * -h @ /dev/hd00 <Return>
Use the track (t) number from your calculations in place of the * symbol. Use the head (h) number from your calculations in place of the @ symbol.
At this point enter;
sync <Return>
sync <Return>

At this point run diagnostics to see that the ID field was restored correctly.

-POINTS TO PONDER-

1. The bad block replacement area of the rigid disk starts at block 3 and ends at block 48. If the disk has bad blocks they were spared to this area. **This area is considered part of the file system.**

2. The swap area (All of partition 1) can be reformatted without any file rebuilding. Partition information can be found in the configuration block.

3. You can reformat the 'boot' area, then rebuild it using Service Notice 0023. The 'boot' area location of each rigid disk is also shown in its configuration block.

4. Major file damage can occur if the area reformatted was in the file system. The file system starts at the beginning of partition 2. The super block , i-list, unix files and user files make up the file system, respectively. **Do not reformat this area.**

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0025A

PROBLEM: Bad block sparing

Over the life of a rigid disk drive it is normal that some bad blocks (bad media) will develop. This procedure, hopefully, will tell you when and how to spare out the bad blocks that develop.

First a determination must be made as to the validity of the bad block. Is it really bad media or is it some other disk system related problem?

Only spare a block if it repeatedly fails either under the 'operating system' or 'hdtest'. Randomly failing blocks should not be spared but the problem with the rigid disk system should be found.

-NOTES-

SPARING A BLOCK DESTROYS ALL DATA IN THAT BLOCK! The diagnostic (hdtest) does not recognize bad blocks sparing. If a block fails repeatedly running 'hdtest', check the configuration block to see if that block is already spared out. If not, sprare it out using the sparing procedure. **DO A FULL SYSTEM BACKUP BEFORE PROCEEDING.**

SOLUTION: Start a normal 'cold boot' bringing the system all the way to the menu that asks you to select F1, F2, or F3 to reload the system. You will note that the last message says that anything else will be treated as a 'maintenance mode' command. At this point enter;
cd /etc <Return>

This will cause the system to change the working directory to /etc and return with the # prompt. At this time enter:
mkconf -i /dev/hd00 /dev/hd00 <Return>

The 'Configuration Block' will now begin to appear on the CRT with '?' prompts. Press the <Return> key to enter the default value until you get the question 'Number of Spare Blocks = 46'? at this time enter:
46 <Return>

At this point we can start sparing bad blocks. Enter the **bad block number** followed by **<Return>** at the first spare entry that ends in 'Bad?'. Repeat this for all known bad blocks.

After entering all bad block numbers enter ; **Done <Return>** at the next spare entry.

Now do a; **rdconf /dev/hd00 <Return>** and check the configuration block. It should now show the bad block as being spared out. Enter;
sync <Return>
sync <Return>

Now recold boot the system.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE Nov 2, 1983

APPROVED

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0026

PROBLEM: Motherboard Failure

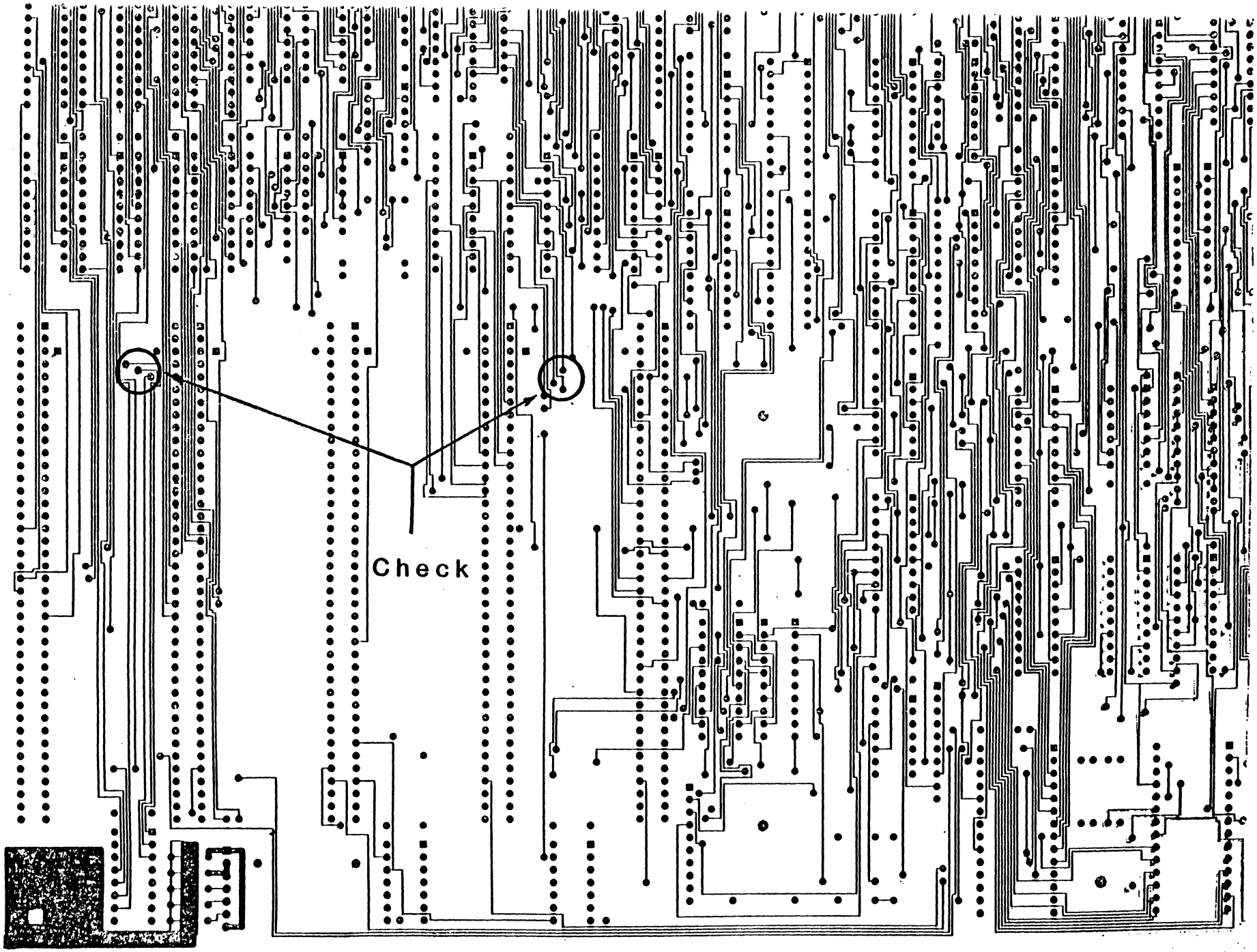
SOLUTION: If a system problem is isolated to a motherboard check the six solder pads, shown in the two circles on the following page, for solder shorts from these pads to adjacent traces. Remove all excess solder with an exacto knife being very careful not to damage the motherboard.

Recheck the motherboard in the system if excess solder was removed.

FORTUNE SYSTEMS CORP.
1501 INDUSTRIAL RD.
SAN CARLOS, CA 94070

DATE 8/18/83

APPROVED H. W. Sander



. Bottom Left Corner - Etch Side - Under I/O Option Slot Connectors

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0027

PROBLEM: **A failing motherboard I/O pal** which shows up most often in systems with fully loaded option slots. The failure will appear in the following two areas:

1. System Clock Circuitry:
Upon bringing up the system from power on, the system may appear to be completely dead. Also, if you should get as far as the password prompt, keyed characters will not be displayed of course but as more and more characters are keyed in (around 15 or so) all the characters keyed so far will suddenly display as a block. The system will then go into lock-up condition.

2. System Display Errors:
These may show up as: Displaying a different character than the one keyed; dropping characters, or most commonly; recognizing in duplicate the last character keyed.

*** THIS PROBLEM HAS BEEN RESOLVED ON ALL MOTHERBOARDS AT REV. 10 AND ABOVE.

SOLUTION: Physically inspect the manufacturer type code on the I/O pal at location **19E** on the motherboard. Yes, it will be necessary to remove the disk module base plate assembly first. If you are experiencing problems as described above you will most likely find a pal with the manufacturers code of **AMD** installed. After peeling back the sticky label on top of the chips, reference the diagrams below for a facsimile of what the logos look like. Order and replace this pal with one made by **MMI**, part number **1000226-01.** When ordering, don't forget to specify **MMI I/O pal** as the description of the part.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Bruce Castle 9/1/83
FLD.ENG.
APPROVED _____ 9/1/83
HDW.ENG.
APPROVED _____ 9/2/83
SFT.ENG.
APPROVED N/A ___/___/___

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0028

PROBLEM: Fortune is now shipping the 30 megabyte disk only expansion chassis. This cabinet has only been tested with the 30 megabyte device. It is possible to add other disks or move the 30 to the CPU, but these configurations have not been tested. In light of this, any changes made to Fortune products that are not in the form of kits from Fortune will **not** be supported by the 800 numbers or be covered under Fortune Maintenance Agreements. Examples of changes are as follows:

A. Additional hard disk added to the expansion chassis.
B. Hard disks rotated between main chassis and expansion chassis.
C. Additional equipment added to expansion chassis.
D. Non-Fortune cables used between main chassis and expansion chassis.
E. Or any other non-Fortune supplied upgrade

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Saint 1/9/84
FLD.ENG.
APPROVED ___/___/___
HDW.ENG.
APPROVED ___/___/___
SFT.ENG.
APPROVED ___/___/___

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0029

PROBLEM: The Fortune 30 megabyte disk only expansion chassis has the disk in the expansion chassis addressed as drive 1. To run the hdtest diagnostic on this drive the following should be done:

A. Load diagnostic
B. Change the drive type to J30
C. Press Execute
D. Type in **init <Return>**
E. Change the unit number from **0 to 1**
F. Press Execute
G. Run test as you would on drive **0**

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 1/9/84
FLD.ENG.
APPROVED Howard W. Painter 1/9/84
HDW.ENG.
APPROVED _____/___/___
SFT.ENG.
APPROVED _____/___/___

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0030A

PROBLEM: The Fortune expansion chassis power supply outputs three voltages.

+5 and +12 for disk drives

+5 and +24 for tape drives.

The power supply has three output connectors. Two of these are labeled **disk** and go to disk drives. The third output connector is for future tape expansion and is labeled **Tape**.

NOTE

THE CONNECTOR LABELED TAPE MUST NEVER BE PLUGGED INTO A DISK DRIVE. THE 24 VOLTS WILL DESTROY THE DISK DRIVE.

SOLUTION:

NOTE

SOME POWER SUPPLIES LEFT THE FACTORY WITHOUT LABELING ON THE POWER SUPPLY CONNECTORS. THE CABLES WITH THE RED, BLACK, AND YELLOW WIRES GO TO THE DISK DRIVES. THE CABLE WITH THE RED, BLACK, AND WHITE WIRES GOES TO THE TAPE DRIVE.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Painter 8/1/84
FLD.ENG. APPROVED [signature] 8/20/84
HDW.ENG. APPROVED [signature] 8/21/84
SFT.ENG. APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0031

PROBLEM: Verification of Serial Pal.

SOLUTION: There are currently two ways to know if a serial pal is failing.

1. Hardware error #26 indicates a bad serial pal.
2. After the system boots up, enter as root and do a **mid** command. A successful print out of the system serial number and the common group ID indicates that the serial pal is good.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ / /
FLD.ENG.
APPROVED _____ / /
HDW.ENG.
APPROVED _____ / /
SFT.ENG.
APPROVED _____ / /

SERVICE NOTICE

NUMBER 0032

PROBLEM: Spare motherboards/software replacement.

SOLUTION: All spare motherboards currently being shipped from Fortune are now manufactured in a way which does not require new software to be loaded after a motherboard replacement.

These motherboards are identified by a tag located between the option slots labeled:

APLC. SFWR
REISSUE
NOT
REQUIRED

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ / / 84
FLD.ENG.
APPROVED _____ / / 84
HDW.ENG.
APPROVED _____ / / 84
SFT.ENG.
APPROVED _____ / / 84

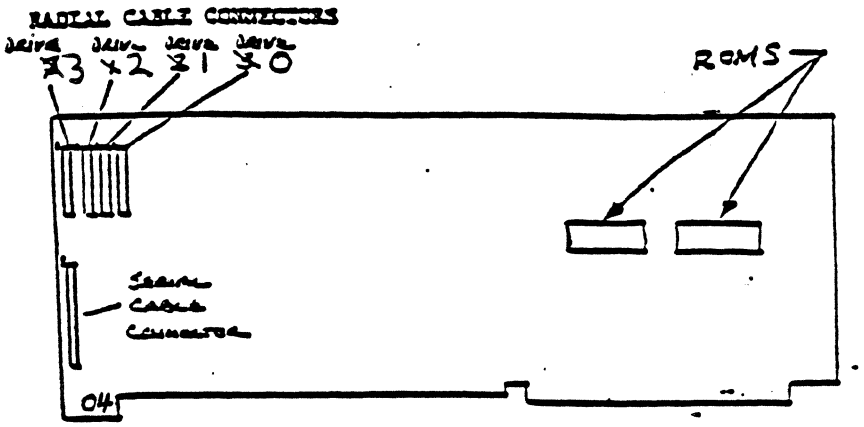
FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0033

PROBLEM: All expansion cabinets have to be connected to a 1000079-04 hard disk controller. The hard disk controller shipped with the expansion cabinet is a 1000079-04. Notice that the drive radial cable connectors have been changed. Drive 0 is now the right radial connector and drive 3 is the left radial connector. The new hard disk controller can be identified by an '04' stamped as shown. Also, there is a daughter board located in the lower left corner.

SOLUTION:



FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 1/18/84
FLD.ENG.
APPROVED _____ /__/__
HDW.ENG.
APPROVED _____ /__/__
SFT.ENG.
APPROVED _____ /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0034

PROBLEM: A document called **CPU UPGRADE INSTRUCTIONS** is shipped with each expansion cabinet. Here is a general summary of the CPU upgrade.

SOLUTION: The 220/330 ohm terminator on the internal disk drive (drive 0) is replaced with a 1000 ohm pull up resistor. This supplies light termination inside the CPU cabinet. The expansion cabinet disk drive (drive 1) is terminated with the normal 220/330 ohm terminator.

A new WD controller (1000079-04) is installed. Notice that the radial (data) cable connectors have been reversed. This WD controller has a daughter board installed that controls the interface lines during power up/down conditions.

Use the existing radial cable to go to drive 0.

Two external plug-in cables are connected between the hard disk controller in the CPU cabinet and the expansion cabinet. Make sure that you plug these two cables into the correct connector. They are keyed so they will not go in upside down. The cable connectors have a blue line on them that is a seating guide. When this blue line is flush against the cabinet it is seated properly.

Power up to expansion cabinet first or within 15 seconds of powering up the CPU cabinet.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY; CA 94065

AUTHOR_____/___/___
FLD.ENG.
APPROVED James E. Ford 1/20/84
HDW.ENG.
APPROVED_____/___/___
SFT.ENG.
APPROVED_____/___/___

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0035

PROBLEM: Initial warm up before formatting.

SOLUTION: Field Engineering advises that the disk back up drive in the expansion cabinet be warmed up for 30 minutes before formatting. This will ensure the best performance over all temperature ranges.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR [signature] 1/18/84
FLD.ENG. APPROVED [signature] 1/19/84
HDW.ENG. APPROVED ____ /__/__
SFT.ENG. APPROVED [signature] 1/__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0036

PROBLEM: The 30 megabyte drives in the expansion cabinet are leaving the factory with a single user 30 megabyte configuration block and no file systems. If you are going to use the expansion cabinet for additional storage you need to do the following.

SOLUTION: Install expansion cabinet and run diagnostics (hdtest) successfully.

Login as **root.**

At the prompt (#) enter; **mkconf -S 0 /dev/hd10 <Return>**

At the prompt (#) enter; **mkfs -a /dev/hd12 <Return>**

sync <Return>

sync <Return>

Enter; **bye <Return>** to return to the login prompt.

Partition 1 has been removed and its space added to that of partition 2.

You have made a file system for partition 2 and can use partition 2 for additional storage. Just mount it to directory h.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR_____/___/___
FLD.ENG.
APPROVED_____/___/___
HDW.ENG.
APPROVED_____/___/___
SFT.ENG.
APPROVED_____/___/___

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0037

PROBLEM: Fortune Systems is now shipping a power supply manufactured by Western Electric under the part number 1001851-01.

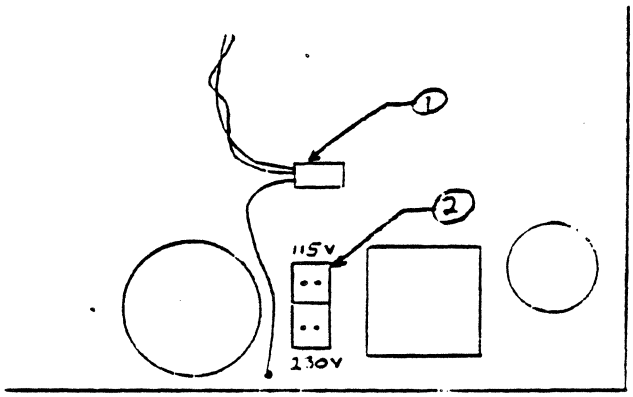
SOLUTION:

1. The WE power supply can be identified by the one and zero printed on the on/off switch at the rear of the CPU.

2. The WE power supply is not currently exchangeable for the Zenith power supply. Therefore, if a WE power supply should fail, it must be replaced by a WE power supply. If a Zenith power supply fails, it must be replaced with a Zenith power supply until interchangeability issues between supplies can be resolved.

3. As with any high power device, care must be taken when handling the power supply. Holding the supply by the heat syncs, transformers, capacitors, or wires may cause failures, or an increased failure rate.

4. Select 110 or 230 VAC operation by moving the jumper plug as indicated on the drawing below. 110 VAC in the upper position, 230 VAC in the lower position.



Front of CPU

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ /__/__

FLD.ENG.

APPROVED _____ /__/__

HDW.ENG.

APPROVED Tom Meyer 1/24/84

SFT.ENG.

APPROVED _____ /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0038

PROBLEM: Erratic system operation or excessive system errors. Intermittent power failure messages.

SOLUTION: Missing earth ground or improperly wired ac power receptacles have been found to cause the above symptoms. Any suspected power line problems should be referred to a qualified electrical contractor for evaluation or repair. Missing or improperly provided earth ground (i.e.),tied to conduit) will degrade system reliability by making the system more susceptible to Radio Frequency Interference (RFI), Electro Static Discharge (ESD) damage, and Electro Magnetic Interference (EMI) from the power line.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ / /
FLD.ENG.
APPROVED _____ / /
HDW.ENG.
APPROVED _____ 1/24/84
SFT.ENG.
APPROVED _____ / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0039

PROBLEM: The Western Electric power supply can now be used to replace a Zenith power supply. A Zenith power supply is not exchangeable for a Western Electric power supply.

SOLUTION: To install a Western Electric power supply in a 32:16, XP or PS system to a Western Electric Power Supply the following sequence is recommended.

1. Remove old power supply.

2. Remove 1001612-01 or 02 capacitor from disk drive assembly as this parts is not needed with the Western Electric supply.

3. If 230 V operation is required, configure supply as shown in figure 3 and attach the required label as shown in figure 2. Make sure that the plug (Figure 3 ref 1) is pressed down firmly in place as the power supply is selected for 230 V operation if the plug is not plugged in all the way.

4. If not already installed, attach copper contacts as shown in figure 1.

5. Install new power supply, reconnect cables.

6. Invert the CPU top cover, and install insulator as shown in figure 4.

7. Reassemble CPU and run diagnostics as required.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ 2/10/84
FLD.ENG.
APPROVED _____ 2/10/84
HDW.ENG.
APPROVED _____ 2/10/84
SFT.ENG.
APPROVED _____ /__/__

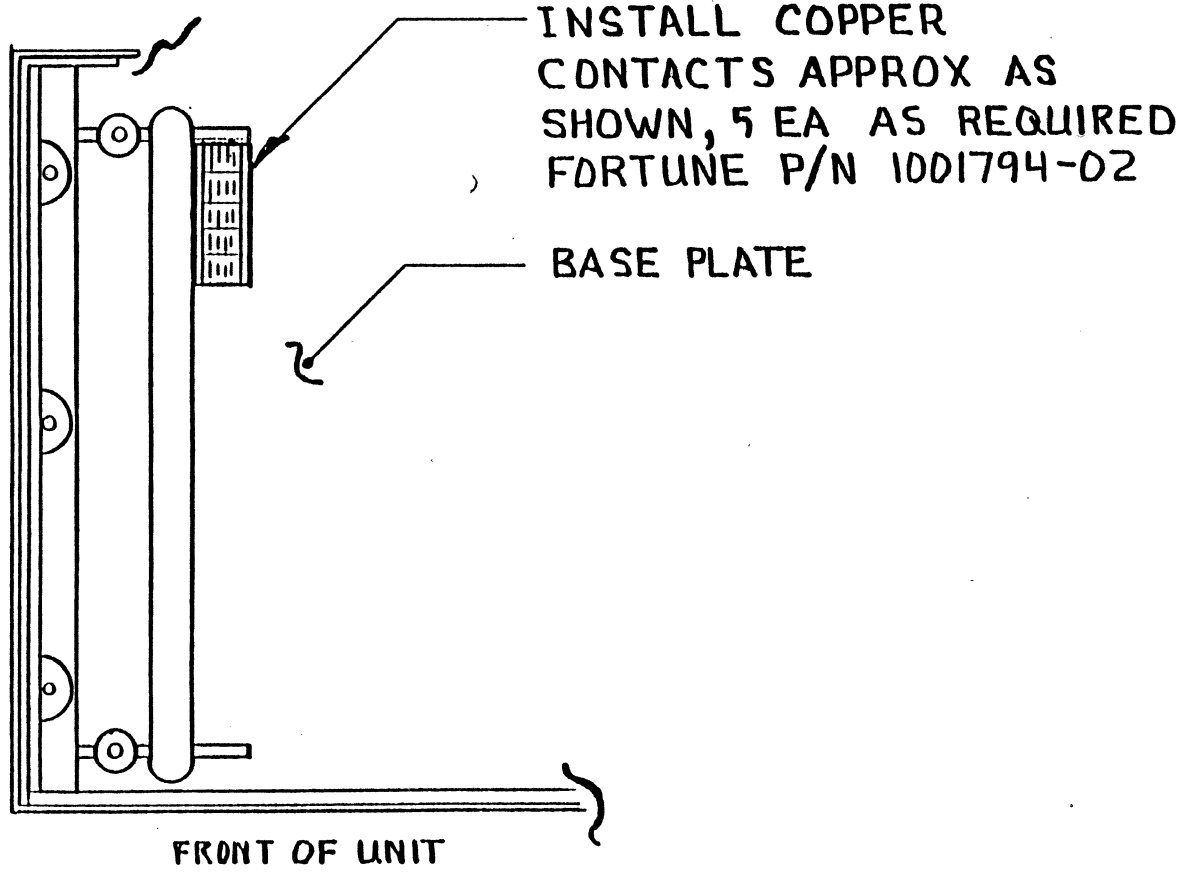
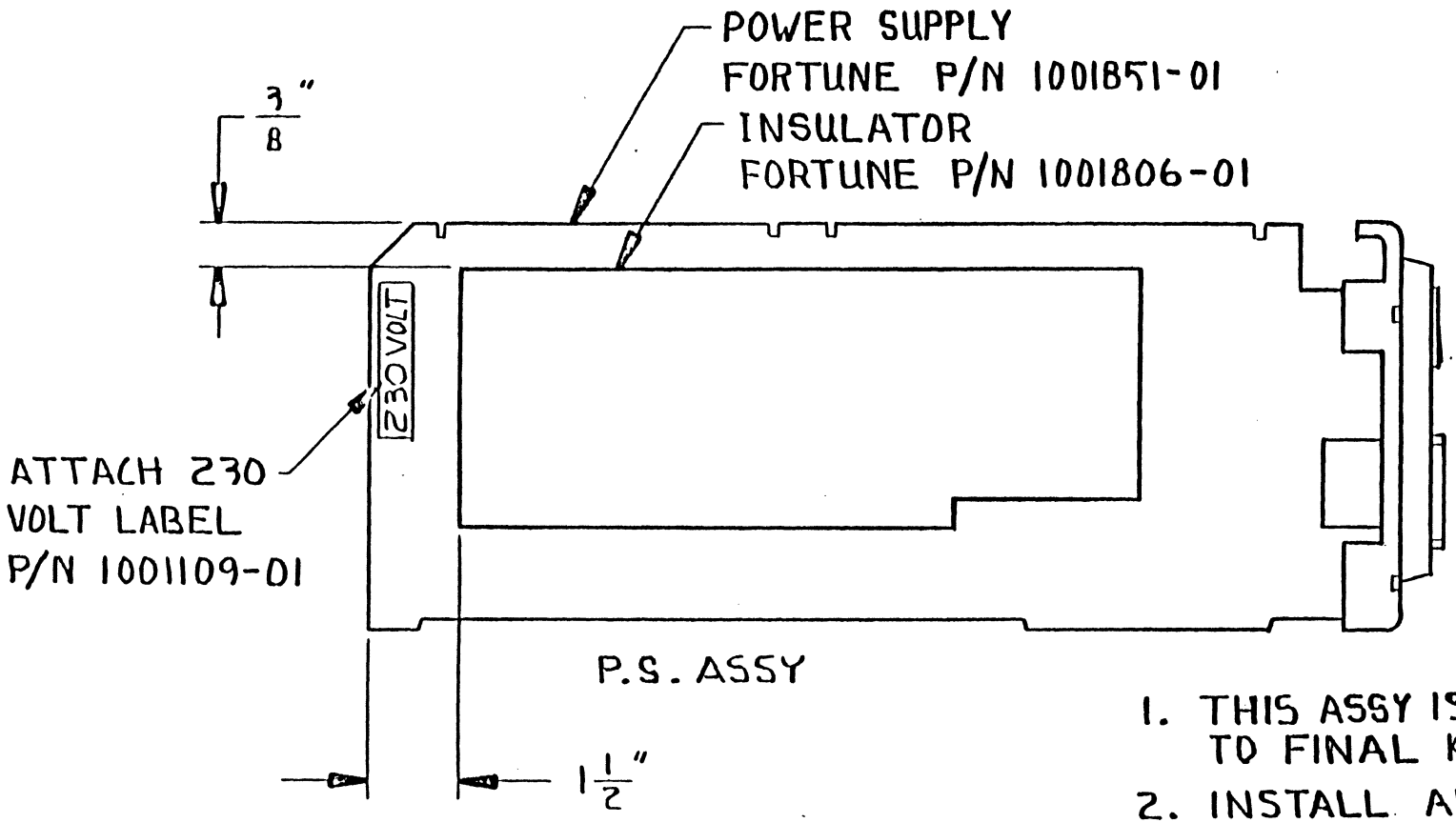

INSTALL COPPER
CONTACTS APPROX AS
SHOWN, 5 EA AS REQUIRED
FORTUNE P/N 1001794-02
BASE PLATE
FRONT OF UNIT

FIGURE 1

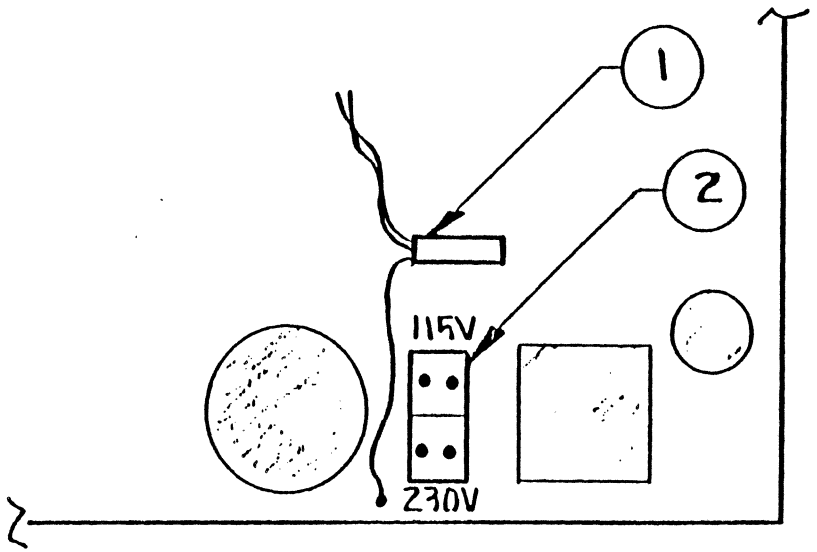


1. THIS ASSY IS MADE PRIOR TO FINAL KIT PACKAGING.
2. INSTALL APPROX AS. SHOWN.

1003093-C
SH 3

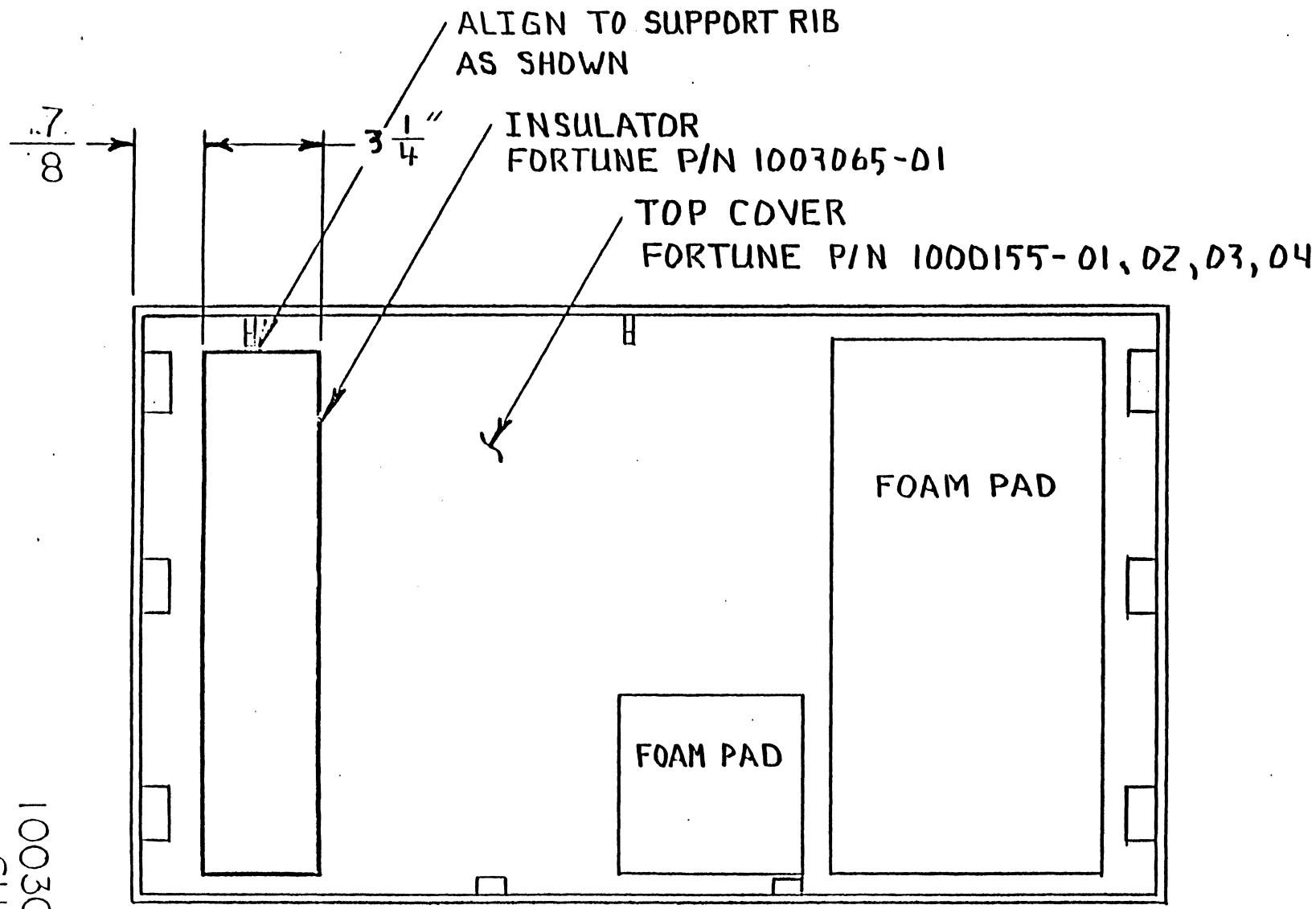
FIGURE 2

POWER SUPPLY INSULATOR ASSY CHASSIS SIDE SHOWN



1. VOLTAGE SELECT PLUG.
2. 115/230 VOLTAGE SELECT POSITION, INSERT PLUG IN TO LOWER POSITION TO CONNECT TO 230V.

FIGURE 3



1003093-01
SH 5

FIGURE 4

TOP COVER INSULATOR ASSY

WIRE HARNESS MUST BE SPREAD OUT THIN IN AREA ① SO AS NOT TO INTERFERE WITH FAN MOUNTS.

WIRE MUST REMAIN BELOW TAB ② SO THAT WIRES DO NOT BECOME PINCHED BY COVER.

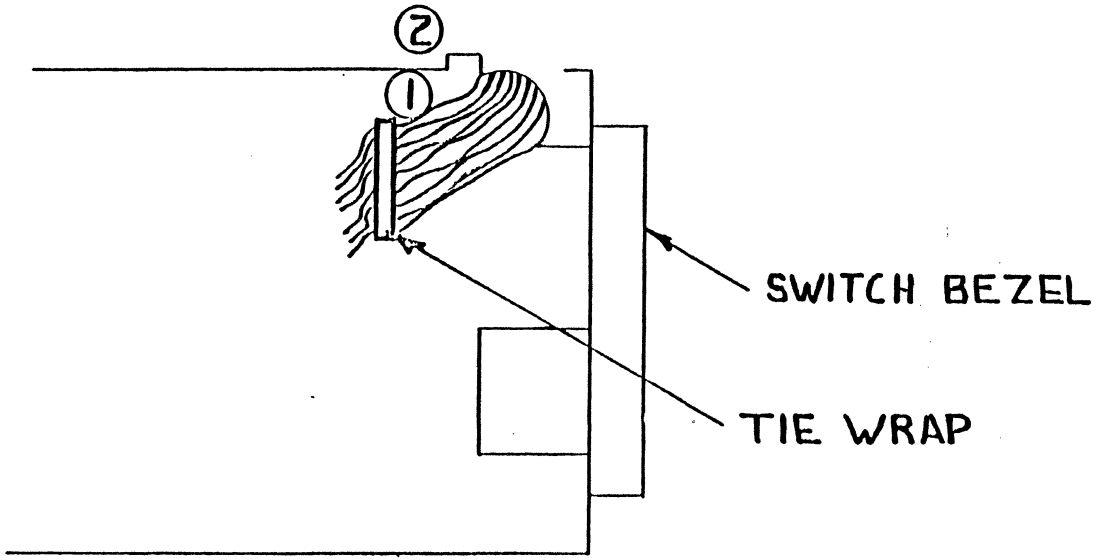


FIGURE 5

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0040

PROBLEM: Changes to Service Notice 0023A when using with For:Pro 1.7 Operating System.

SOLUTION: Always do a **mkconf -U * /dev/hd00 <Return>** where * is the number of users. 1.7 defaults the configuration block to a zero user system so even for a one user system you have to do this command.

Always rebuild the boot program after rebuilding the configuration block. 1.7 defaults the conf. block to zero boot devices so you have to add boot information to the conf. block.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Saint 9/84
FLD.ENG.
APPROVED 4/2/84
HDW.ENG.
APPROVED 4/17/84
SFT.ENG.
APPROVED 4/20/84

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0041

PROBLEM: Field Engineering recommends that a B9 or higher level WD Controller be used as a spare replacement in 20meg and XP systems. Don't put a lower level WD Controller in these higher performance disk drives.

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR [signature] 4/9/84
FLD.ENG.
APPROVED [signature] 4/9/84
HDW.ENG.
APPROVED [signature] 4/17/84
SFT.ENG.
APPROVED N/A __/__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0042

PROBLEM: Intermittent hard disk drive errors.

SOLUTION: Disconnect all cables, both power and signal, going to both drives. Measure (ohms) between disk drive shields and conformal coating in base of CPU cabinet. (Conformal coating is that black coating on the inside of the cabinet.) You should measure an open between these two points. If you have a short either the hard disk shield is shorting to the power supply or the front lip of the disk mounting chassis is shorting to the conformal coating. To fix put an insulator between the shield and the power supply or put electrical tape on the lip of the disk mounting chassis. Make sure that the 20 meg hard drive small shield has an insulator on top of it so that the top cover conformal coating does not short out to the shield when the top cover is installed.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 4/9/84
FLD.ENG. APPROVED [signature] 4/13/84
HDW.ENG. APPROVED [signature] 4/17/84
SFT.ENG. APPROVED N/A /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0043

PROBLEM: When servicing a 32:16/XP 32:16 that has an expansion cabinet installed, make sure that any new hard drive that you put in the CPU cabinet has a 1K ohm pull up resistor installed in place of the 220/330 ohm terminator. You will have to take the pull up resistor out of the old drive and put it in the new drive.

Remember, when troubleshooting an expanded system, that the CPU cabinet will run Diagnostics without the expansion cabinet installed.

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 4/9/84
FLD.ENG.
APPROVED [signature] 4/9/84
HDW.ENG.
APPROVED Bradley Repabe 4/17/84
SFT.ENG.
APPROVED N/A /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0044

PROBLEM: As of 4/2/84 the hard disk controller used with the expansion cabinet is going through a more intensive check out procedure. Field Engineering thinks this will resolve the current problem with expansion cabinet installation.

SOLUTION: On hard disk controllers shipped before this date check all cabling before attempting to install. Take off the I/O adapter (on back of hard disk controller) and make sure the data cables are plugged correctly at both ends. Make sure the control cable is plugged correctly at both ends. Make sure the piggyback board in the lower left corner is seated properly.

If you have problems with the system after installing the expansion cabinet and it looks like the hard disk controller is the problem call our 800 support number for a replacement.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 4/10/84
FLD.ENG.
APPROVED [signature] 4/10/84
HDW.ENG.
APPROVED Dan Jones 4/13/84
SFT.ENG.
APPROVED N/A /__/__

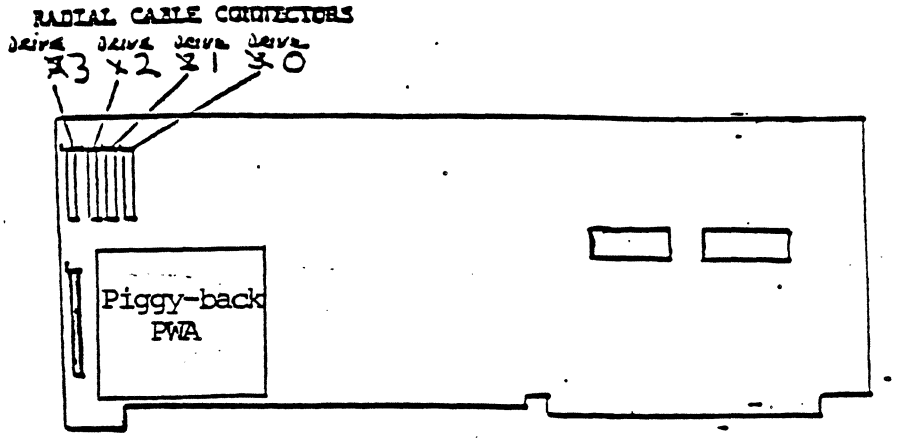
FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0045

PROBLEM: Effective 4/16/84 all computers being built by Fortune Systems Corporation will have a 1000079-04 hard disk controller installed. All repair and return 1000079-01 hard disk controllers will be replaced by/or upgraded to 1000079-04 hard disk controllers. The 1000079-04 hard disk controller has the radial (data) cables connectors reversed and a piggy-back PWA has been installed. The piggy-back PWA enables the hard disk controller to be used with multiple drive systems.

SOLUTION:



FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 4/16/84
FLD.ENG.
APPROVED [signature] 4/16/84
HDW.ENG.
APPROVED Pradip Mozgale 4/17/84
SFT.ENG.
APPROVED N/A /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0046

PROBLEM: The first release of the tape streamer software does not automatically have the capability of full system restore. When a full system backup is done, four files and one directory have to be saved on floppy disk. Below are the files and directory that have to be saved.

/m/menu	Directory
/etc/fstab	File
/etc/devtype	File
/etc/passwd	File
/etc/group	File

Now let's explain why these have to be saved. When files are pulled off the streamer tape, they are only restored to the hard disk if they do not exist on the hard disk. So, when we have to cold boot the system, the above files are put on the hard disk from the cold boot set. When we restore the system from streamer tape, these files are not updated.

SOLUTION:

Backing Up

Login as Manager. Backup the full system by selecting:

S6	on the Global menu
T	on the Additional Choices menu
Backup	on the Tape Streamer Utilities menu
Create	on the Backup menu,
No Query	on the Backup Confirmation menu

Assign a backup set name of root and use / for files and/or directories to be backed up.

Now, let's go through how to create a Tape Restore floppy disk. Insert a blank floppy disk in the floppy disk drive. Use the Menu System to format the floppy disk. From the Global menu:

S1	for System Utilities
32	to format a blank floppy disk

After the floppy disk is formatted, go back to the log-in message and log-in as root. At the unix prompt (#), type in:

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Pauto 5/30/84
FLD.ENG.
APPROVED Wynn Bowman 5/30/84
HDW.ENG.
APPROVED [illegible] 5/30/84
SFT.ENG.
APPROVED [illegible] 5/30/84

mount /dev/fd02 /f <RET>
cp -roust /m/menu /f <RET>
cp /etc/fstab /f <RET>
cp /etc/devtype /f <RET>
cp /etc/passwd /f <RET>
cp /etc/group /f <RET>
umount /dev/fd02 <RET>
bye <RET>

You now have a Tape Restore floppy disk. Label it and save it with your streamer tape.

Restoring

When for some reason you have to do a full system restore, you have to:

1. Cold boot the system

2. Install the multi-user software, if applicable

3. Install the tape streamer software

4. Do a full system restore by selecting:

   S6 on the Global menu
   T on the Additional Choices menu
   Restore on the Tape Streamer Utilities menu
   No Query on the Restore Confirmation menu

   Remember the backup set name is root.

   At the Files and/or Directories to be Restored Question, enter: **/ <RET>**.

5. When the Tape Restore is complete, insert the Tape Restore floppy disk that was made at backup time.

6. Go back and log-in as root. At the unix prompt (#), enter:

   mount /dev/fd02 /f <RET>
   cp -roust /f/menu /m <RET>
   cp /f/fstab /etc <RET>
   cp /f/devtype /etc <RET>
   cp /f/passwd /etc <RET>
   cp /f/group /etc <RET>
   umount /dev/fd02 <RET>
   bye <RET>

Your systemm is now restored. Do a shutdown and bring the system back up to re-initialize.

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0047

PROBLEM: Power Supply and Disk Drive Identification

SOLUTION:

Power Supplies:

Fortune Systems Corporation has used three (3) power supplies since it began shipment of 32:16's in August, 1982.

The first was a 22 amp supply (1000050-01 or 02). The Zenith part number (OE-A-00012 is located on the back of the supply. It can be further identified by the absence of a small coil on the power supply electronics board. See figure 1.0 for details.

The second was a 28 amp supply (1000050-03 or 04) also manufactured for Fortune by Zenith. The Zenith part number (OE-A-00012-01) is located on the back of the supply. It can be further identified by the presence of a small coil on the power supply electronics board. See figure 1.0 for detail.

The third is a 32 amp supply (1001851-01 or 02) manufactured for Fortune by Western Electric.

This supply can be recognized by a perforated shield along the top of the power supply.

Disk Drives:
The easiest way to find which type hard disk drive is installed in the system is to read the system configuration sticker on the back of the 32:16.

J30-CDC 30 Meg
J20-CDC 20 Meg
C20-Rodime or Ampex 20 Meg
I20-Distron 20 Meg
B10-Miniscribe 10 Meg
A10-Seagate 10 Meg
Z05-Seagate 5 Meg

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 5/30/84
FLD.ENG.
APPROVED Wynn R. Bauman 5/30/84
HDW.ENG.
APPROVED [illegible] 5/24/84
SFT.ENG.
APPROVED N/A

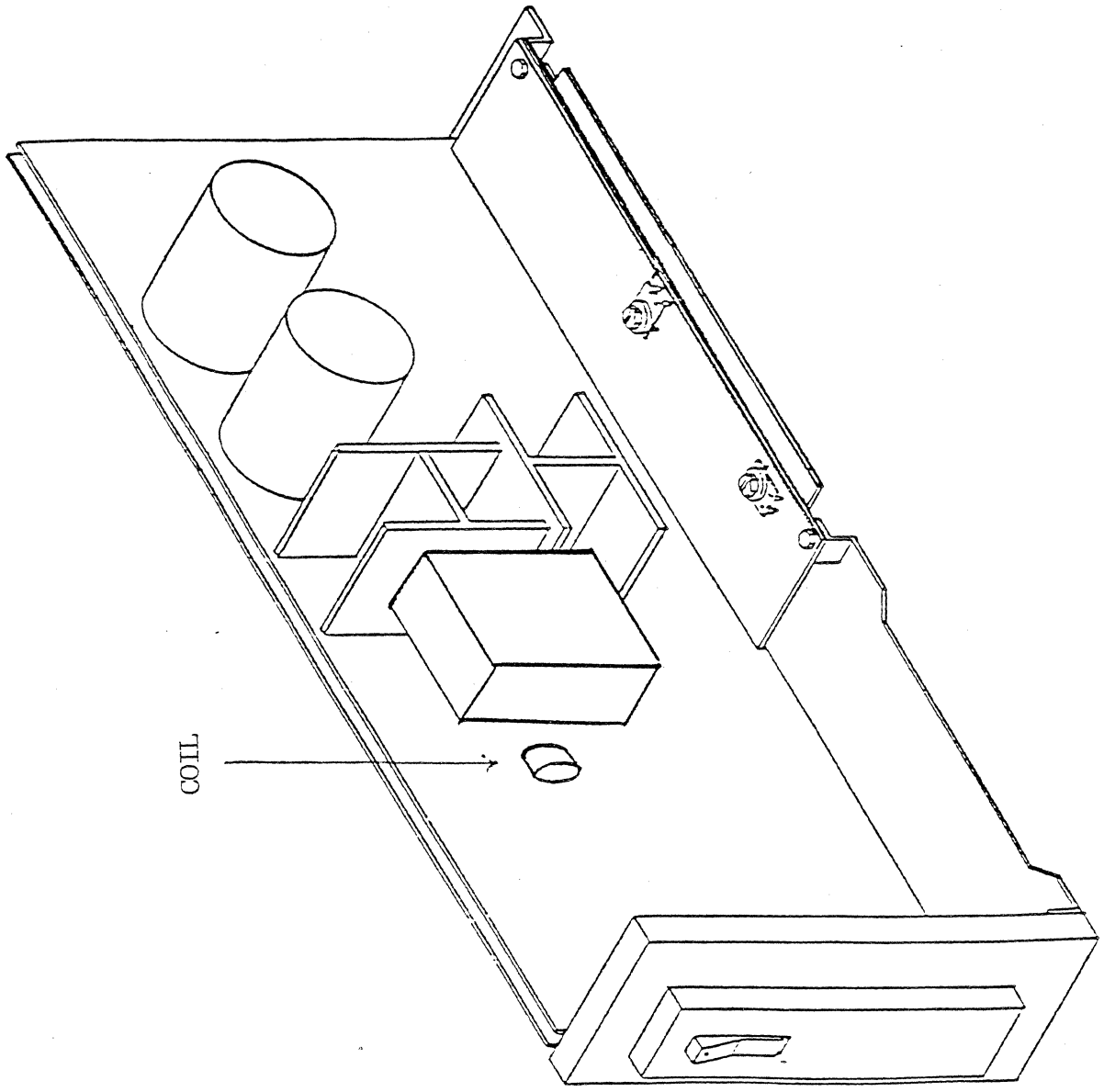


FIGURE 1.0

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0048

PROBLEM:

Now it is possible to have a system with 3 disk drives. The original disk drive in the CPU cabinet plus two 30 meg disk drives in the expansion cabinet. This service notice will try to explain their addressing and termination.

The drive in the CPU cabinet is addressed as Drive O. It has a one K ohm pull up resistor for termination.

The left drive in the expansion cabinet is addressed as Drive 1. It has the 220/330 ohm terminator.

The right drive in the expansion cabinet is addressed as Drive 2. It has no termination.

SOLUTION:

When one of these drives has to be replaced, it is very important that the address and termination be checked and that the replacement drive be set up accordingly.

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 5/30/84
FLD.ENG.
APPROVED Wynn Bowman 5/31/84
HDW.ENG.
APPROVED [signature] 5/30/84
SFT.ENG.
APPROVED NA

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0049

PROBLEM: Incompatibility when interchanging different FIS 1000 motherboards and bases.

SOLUTION: It is now possible to order the following two items from Customer Service.

1.	Keyboard harness (long)	1000048-01
2.	FIS 1000 Installment kit	1003108-01

The FIS 1000 installation kit consists of the following items:

1.	2 ea. screws 6-32 X 11/16	1000303-05
2.	2 ea. lock washers #6	1000411-01
3.	2 ea. Hex nuts 6-32	1001094-01
4.	2 ea. piece of electrical tape 3 inches long.	

The FIS 1000 installation kit will go out with all spare motherboards. The keyboard harness will go out with spare 1000100-XX motherboards. If you need either the keyboard harness or FIS 1000 installation kit for existing spares, order them through Customer Service.

Use the following pages for reference when installing FIS 1000 motherboards.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Saunter 5/30/84
FLD.ENG.
APPROVED Wynn Bowman 5/30/84
HDW.ENG.
APPROVED _____ /__/__
SFT.ENG.
APPROVED N A /__/__

The original version of the FIS 1000 (manufactured between May and September of 1982) had a metal base. The power supply was mounted on the motherboard 1000100-XX (which had no standoffs) with four plastic fasteners. There is no way to screw the power supply to the base. There are very few, if any, 1000100-XX motherboards (without standoffs) as spares. This document will only cover motherboards with standoffs embedded into the motherboard.

The second version of the FIS 1000 had a metal base. The power supply was mounted on the motherboard 1000100-XX (which had standoffs) with two screws and two plastic fasteners. The two screws screwed into the base of the FIS 1000.

The third version of the FIS 1000 is the one we are manufacturing today. It has a plastic base. It was either a 1000100-XX or a 1001246-XX motherboard and the power supply is mounted to the motherboard with two screws and two plastic fasteners. The two screws screw into the base of the FIS 1000.

This document is designed to allow interchangeability between the last two versions. It is designed in parts, so go to the part that applies to your particular need.

Part 1 - 1001246-XX motherboard into original metal base.
Part 2 - 1000100-XX motherboard with standoffs into original metal base.
Part 3 - 1001246-XX motherboard into second version of metal base.
Part 4 - 1000100-XX motherboard with standoffs into plastic base.

Part 1 A. If a spare 1001246-XX motherboard is installed into the oldest metal base there is no way to screw the power supply to the base and on a few motherboards the mounting holes closest to the keyboard connector may not line up.

B. Use the screws, lock washers and nuts supplied with the kit plus two plastic fasteners from the old motherboard to secure the power supply the the motherboard. Fasten the power supply to the motherboard before mounting into the base. Put the nuts and lock washers on the power supply side of the motherboard.

C. If the mounting hole nearest the keyboard connector does not line up with the base, tape the ground strap so it does not short out. Tape the unused screw to the inside of the base.

Part 2 A. If a spare 1000100-XX motherboard with standoffs is installed into the oldest metal base there is no way to screw the power supply to the base.

Use paragraph B of Part 1 to resolve.

Part 3 A. If a spare 1001246-XX motherboard is installed into the second version of the metal base on a few motherboards the mounting hole nearest the keyboard connector may not line up.

Use Paragraph C of Part 1 to resolve.

Part 4 A. If a 1000100-XX with standoffs is mounted into a plastic base the keyboard harness may be too short and the mounting hole nearest the keyboard connector may not line up.

B. If the keyboard connector harness is too short replace with 1000048-01.

C. If the mounting hole closest to the keyboard connect does not line up, tape the ground strap so it does not short out. Tape the unused screw to the inside of the base.

FORTUNE SYSTEMS CORP.

SERVICE NOTICE

NUMBER 0050

PROBLEM: Fortune Systems Corp. Field Engineering Department will not automatically send out streamer tape diagnostics. If you are going to sell and maintain streamer tape expansion cabinets, please call Field Engineering at (415) 593-9000, Ext. 426 and we will send you a diagnostic floppy and instructions.

SOLUTION: The streamer tape is connected to the main system through A PIO board. Always run the PIO diagnostic first if you suspect streamer tape problems.

The PIO diagnostic is on your diagnostic floppy (1000834-03 Release 3.1) under the name fd02/pio. It runs exactly like the comb diagnostic. When the diagnostic menu appears, type: **a*** **<RET>** (where * is the slot where the PIO is installed; type: **g <RET>** and the diagnostic will run to completion. Type: **q <RET>** to exit to the boot prompt.

After the PIO diagnostic has run successfully, there is an alternate way to test the streamer tape without streamer tape diagnostics.

Testing Procedure

Insert a blank streamer tape cartridge into the streamer tape. Login as Manager. Run test by selecting:

S6 on the Global Menu
T on the Additional Choices Menu
Backup on the Tape Streamer Utilities Menu
Create on the Backup Menu
No Query on the Backup Confirmation Menu

Assign a backup set name of diag and use /etc/fsck for files and/or directories to be backed up.

After the file /etc/fsck is written to tape, respond to the prompt with <RET>. See if you can read the file /etc/fsck from tape by selecting:

List from the Tape Streamer Utilities Menu
All from the List Menu

The streamer tape will now read the tape and display the /etc/fsck header.

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 5/30/84
FLD.ENG.
APPROVED Wynn R. Bowman 5/30/84
HDW.ENG.
APPROVED [illegible] 5/30/84
SFT.ENG.
APPROVED [illegible] 5/31/84

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0051

PROBLEM: It has been determined that there is a possibility of the left/front boss (post) on the top cover shorting to a trace on the front of the Western Electric power supply.

SOLUTION: Remove the top cover. Scrape all of the conformal coating off of this boss (post) (Conformal coating is that dark gray coating sprayed on the inside of the cabinet.) Re-install top cover.

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Painter 5/2/84
FLD.ENG.
APPROVED Wynn Bowman 5/30/84
HDW.ENG.
APPROVED
SFT.ENG.
APPROVED NA

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0052

PROBLEM: The streamer tape drive, Fortune Part Number 1001755-01 (consisting of the drive and the upper and lower PWA), is a complete assembly. The drive and the two formatter boards must stay together as one assembly.

SOLUTION: When you have determined the drive is bad, remove the two formatter boards as a unit by removing the four screws securing them to the mounting brackets. You will have to unsnap the plastic catches that hold the two boards together and raise the top board so you can unscrew the left/rear mounting screw.

Remove and save the signal cable (1001797-01) between the formatter boards and the drive. (When re-installing, disregard the <u>This Side Up</u> designation. Early cables were labeled wrong.)

Remove the four screws securing the tape drive to the base of the cabinet.

Send the drive and the two formatter boards to Fortune for repair.

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 5/30/84
FLD.ENG.
APPROVED Wynn R. Bowman 5/30/84
HDW.ENG.
APPROVED [illegible] 5/30/84
SFT.ENG.
APPROVED NA

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0053

PROBLEM: When you order a Western Electric Power Supply (Part Number 1001851-01), you only get the power supply.

SOLUTION: If you order the Western Electric Power Supply Upgrade Kit (Part Number 1003177-01), you get the power supply plus all of the pieces you need for replacing a Zenith Power Supply with a Western Electric Power Supply.

The Kit consists of:

1. #1001851-01 Power Supply
2. #1001806-01 Insulator
3. #1003065-01 Insulator
4. #1001794-02 RFI/EMI Shielding Gasket
5. #1001109-01 Label

See Service Notice #0039 for installation instructions

See Service Notice #0051 for additional instructions

FORTUNE SYSTEMS
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W. Painter 5/30/84
FLD.ENG.
APPROVED Wynn R. Bowman 5/30/84
HDW.ENG.
APPROVED
SFT.ENG.
APPROVED N/A

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0054

PROBLEM: New location of serial pal.

SOLUTION: On the new XP Motherboard Part Number 1001177-01 and the new PS Motherboard Part Number 1001177-02 the location of the serial pal has been changed to 14A.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Painter 8/17/84
FLD.ENG.
APPROVED Wynn D. Bruning 8/20/84
HDW.ENG.
APPROVED Carl Eberle 8/21/84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0055

PROBLEM: The Streamer Tape Subsystem will not function properly when Hard Disk Drive #1 is used as the main system drive. The Streamer Tape Subsystem was designed to use Hard Disk Drive #0 as the main system drive.

SOLUTION: Future revisions of the streamer tape software may allow Drive #1 to be used as the main system drive.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Sainter 8/17/84
FLD.ENG.
APPROVED [illegible]
HDW.ENG.
APPROVED [illegible]
SFT.ENG.
APPROVED J Swick 8/21/84

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0056

PROBLEM: Problem encountered when removing a CommA and replacing with a PIO for streamer tape operation.

SOLUTION: If you remove a CommA and replace it with a PIO, remove the device connections for that CommA card.

The device connections for the CommA cards are as follows:

CommA in Slot B - TTY02-TTY05
CommA in Slot C - TTY06-TTY09
CommA in Slot D - TTY10-TTY13

Use the menu system. **S2** for system management. **39** for device connections. Select the device connection you are removing. **8** to remove.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Gaunte 8/17/84
FLD.ENG.
APPROVED Wynn T Bannon 8/20/84
HDW.ENG.
APPROVED Carl Ellis 8/21/84
SFT.ENG.
APPROVED J Lueck 8/21/84

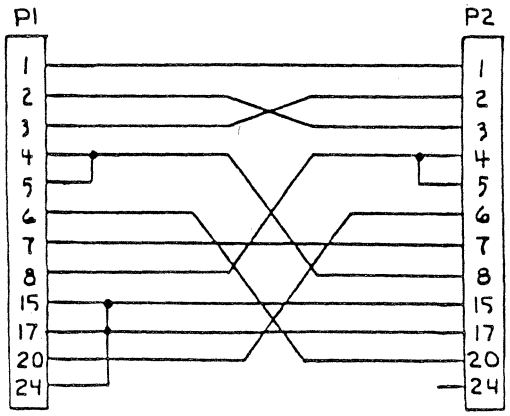
FORTUNE SYSTEMS CORP

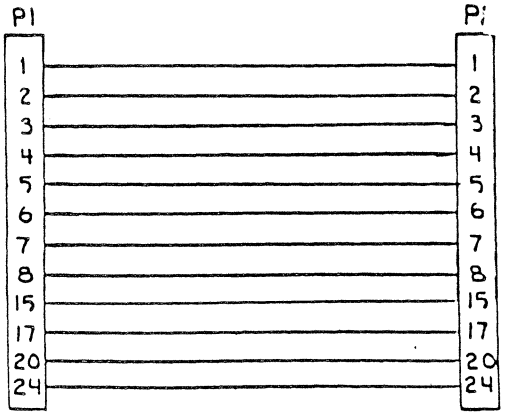
SERVICE NOTICE

NUMBER 0057

PROBLEM: CommB (intelligent communication) controller cables.

SOLUTION: Below are the part numbers and pin configurations of the CommB cables.





1000633-13	6 Ft.	Female to Female	1000633-15	10 Ft.	Female to Male
1000633-14	6 Ft.	Female to Male	1000633-16	20 Ft.	Female to Male
			1000633-17	50 Ft.	Female to Male

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Painter 8/17/84
FLD.ENG.
APPROVED Wynn R Seaman 8/20/84
HDW.ENG.
APPROVED [illegible] 8/21/84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0058

PROBLEM: Fortune System Corporation will phase in a new CPU cabinet during the month of August, 1984. This cabinet is 3/4 of an inch wider and 1/2 of an inch higher than the old cabinet.

All components inside this cabinet will stay the same, except for hard disk drive termination. (see Service Notice #59)

SOLUTION: The cabinet itself has the following changes that you should be aware of:

1. Two additional screws hold the top cover on. They are located at the back of the cabinet. They come up through the back panel and screw into the top cover.

2. The top screw on the hard disk controller screws into the back panel, not into the top cover.

3. The front panel no longer is secured with clamps. It rotates and snaps into the base.

4. The memory cards are held in by a bracket that screws to the back panel.

5. The fan A/C power connection is at the top instead of at the bottom of the fan.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Harold Wayne Santa 8/17/84
FLD.ENG.
APPROVED Ford W. Santa 8/20/84
HDW.ENG.
APPROVED Val Eliseo 8/21/84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0059

PROBLEM: Beginning with the August, 1984 build, Fortune Systems Corporation will ship a 1K Pullup Resistor installed in the hard disk drive in the CPU cabinet (Drive #0) and in all spare hard disk drives.

The left drive in the expansion cabinet (Drive #1) will still use the 220/330 ohm terminator.

SOLUTION: The part number of the 1K Pullup Resistor is 1001725-02 for th DIP type and 1000352-07 for the SIP type.

-NOTE-

SIP - Single Inline Package
DIP - Dual Inline Package

You can replace a drive in the CPU that has a 220/330 terminator with a spare drive that has a 1K Pullup resistor without a problem. The hard disk controller works equally well with either type termination in systems without disk expansion cabinets. In systems with disk expansion cabinets, a 220/330 ohm terminator will still have to be used in Drive #1.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Beaver 8/17/84
FLD.ENG.
APPROVED [illegible] 8/20/84
HDW.ENG.
APPROVED [illegible] / /
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0060

PROBLEM: Grinding Interrupt #5

SOLUTION: This error message is usually caused by a communication input to the CPU or a problem with one of the CommA cards.

One troubleshooting procedure is to remove the communications cables. If the problem ceases, you will have to find the problem cable by connecting cables one at a time.

If the problem persists with the communication cables removed, one of the CommA cards is probably bad. Remove one at a time until problem ceases.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHINS DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard Wayne Painter 8/17/84
FLD.ENG.
APPROVED [signature] 8/20/84
HDW.ENG.
APPROVED [signature] 8/21/84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0061

PROBLEM: The disk mounting chassis in the new CPU cabinet is isolated from the three metal mounting posts with six insulating washers, three on the bottom and three on the top. The left front post does not have to be isolated - it is plastic. The insulating washers on the top may come off when the mounting chassis screws are removed.

SOLUTION: Always make sure that each of the three mounting holes is isolated from its post. If not, soft and hard errors on the hard disk drive may result.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR Harold W. Painter 10/17/84
FLD.ENG.
APPROVED ____ __/__/__
HDW.ENG.
APPROVED [illegible] 10/__/84
SFT.ENG.
APPROVED N/A __/__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0062

PROBLEM: The Micropolis 45 meg. Hard Disk Drive will only function properly with a 1000079-06 hard disk controller. The 1000079-06 hard disk controller can be recognized by the presence of two piggyback boards on the hard disk controller board. It is also recommended that a Western Electric Power Supply be used with the above drive. The Micropolis 45 meg Hard Disk Drive is shipped with a 1K ohm pullup resistor in place of the 220/330 ohm terminator.

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR Howard W Sachs 10/12/84
FLD.ENG.
APPROVED _____ / / 84
HDW.ENG.
APPROVED [signature] 10/17/84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0063

PROBLEM: Fortune Systems Corporation is now shipping half high floppy disk drives. They are completely compatible with the full high floppy disk drive data format. The door open/close switch on the half high floppy disk drive must never be closed unless a floppy disk is installed in the drive. Forcing the door closed without a floppy disk installed will damage the drive.

- NOTICE -

The drive type, in the Maintenance Menu, must be set to Tandon when using half high floppy disk drives.

SOLUTION:

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR [signature] 10/12/84
FLD.ENG.
APPROVED _____ / / /
HDW.ENG.
APPROVED [signature] / / 84
SFT.ENG.
APPROVED NA / / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0064

PROBLEM: The half high floppy drive mounting bracket has two screws, one on each side, that are used to adjust the height of the drive so it will fit through the hole in the front bezel.

SOLUTION: If the height ever has to be adjusted, it can be done from either side using a long Phillips screwdriver. The half high floppy can be removed from its mounting bracket without touching the two adjusting screws so, when it is replaced, no adjustment is necessary.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR W. Pentz 10/17/84
FLD.ENG.
APPROVED _____ / / 84
HDW.ENG.
APPROVED [illegible] / / 84
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0065

PROBLEM: The half high floppy disk drive is very quiet and the front panel light is very dim.

SOLUTION: After working with full high floppy disk drives, it may be hard to recognize when the drive is working. Remember that the drive is very quiet. The full high floppy disk drives always had a very dim front panel light when the drive was idle. The half high floppy disk drive front panel use light is no brighter than the full high floppy disk drive idle light. So, remember the words are quiet and dim for half highs.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR _____ / /
FLD.ENG.
APPROVED _____ / /
HDW.ENG.
APPROVED _____ / /
SFT.ENG.
APPROVED N/A / /

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0066

PROBLEM: There is no entry in hdtest for Micropolis 45 Meg Disk Drives.

SOLUTION: Since there is no drive entry for Micropolis 45 Meg Drives, you can run diagnostics by making your own disk drive entry. To do this, do the following after the diagnostic is loaded.

Select drive type = Other using the right arrow key.
Press the Execute key.
Type in: init <return>.
A menu will appear in the middle of the screen.
Change the menu to reflect the following:

```
Unit number =   0
Step Rate   =   0
Address     =   0
Block Count =   1
Interleave  =   2
Blk/Track   =  17
Loop Count  =   1
# of Cyls   = 830
# of Heads  =   6
WPRECMP Cyl = 831
```

Press the Execute key
Press the F9 function key
Run diagnostics normally

Remember to check the bad block table in the configuration block before running diagnostics. Disregard all diagnostic error entries for these blocks.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR [illegible] __/__/__
FLD.ENG.
APPROVED [illegible] __/__/__
HDW.ENG.
APPROVED [illegible] 10/1/84
SFT.ENG.
APPROVED N/A __/__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0067

PROBLEM: The eight captive screws that hold the top cover to the new CPU cabinet have been changed.

SOLUTION: These screws are now Phillips instead of slotted and they are longer than the old ones. When removing the cover, turn these screws counter-clockwise until you hear a popping sound. This sound means the screw is loose and you will not have to go back and loosen it some more later.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR_____/__/__
FLD.ENG.
APPROVED_____/__/__
HDW.ENG.
APPROVED_____/__/__
SFT.ENG.
APPROVED N/A /__/__

FORTUNE SYSTEMS CORP

SERVICE NOTICE

NUMBER 0068

PROBLEM: The wrong type of tape cartridge is being used with the Fortune Systems Corp. Streamer Tape Drive.

SOLUTION: Fortune Systems Corp. recommends that the only tape cartridge to use with its streamer tape is the Cipher certified tape cartridge sold by us or a Scotch DC300XL (or equivalent) tape cartridge. The two above tape cartridges contain 450 ft. of 1/4 inch wide tape and the magnetic coating on the tape was designed to be used with the streamer tape drive used by Fortune Systems Corp. Tape cartridges with 600 ft. of tape may give unreliable operation because of differences in magnetic coating.

FORTUNE SYSTEMS CORP.
101 TWIN DOLPHIN DRIVE
REDWOOD CITY, CA 94065

AUTHOR [illegible] / / 81
FLD.ENG.
APPROVED [illegible] / / 81
HDW.ENG.
APPROVED [illegible] / / 81
SFT.ENG.
APPROVED N/A / / 81

N O T E S

N O T E S